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(Tenth Article)

SURFACE ENRICHMENT AND MINOR SUBDIVISIONS OF LARGE PRIMARY MASSES IN WOOD.

Minor Subdivisions.

THIS article is, in part, a brief summary and review of Rules 1 and 2 (vertical and horizontal major divisions) with application to minor subdivisions. By minor spacings or subdivisions in woodwork we refer to the areas occupied by drawers, doors, shelves and other small parts subordinated in size to the large or major divisions such as large front or side panels, etc. These smaller or minor subdivisions in woodwork are bounded by runners, rails, guides and stiles depending upon the form of construction and character of the minor subdivision. Major divisions are often bounded by legs, table tops and principal rails.

It is an interesting and useful fact that rules governing major divisions apply equally well to minor parts. There are a few exceptions and additions to this statement to be noted in their appropriate places.

When minor subdivisions are well planned, they supply one of the most interesting forms of surface enrichment or treatment, for if we consider paneling an appropriate form of decoration, we are equally privileged to feel that each small drawer or door adds its quota of interest to the sum total of the entire mass. We are equally justified in accenting these drawers or doors with panel decoration or other forms of surface enrichment, provided that harmony is maintained.

These minor subdivisions, properly enriched, may become equalizers, or elements which adjust the design to the character of the surroundings destined to receive the project of which they are a part.

Vertical Sections and Their Divisions.

With reference to the illustrations, Figure 247 is a simple minor panel treatment falling under Rule 3a. (See end of article.) Single or preferably double band inlay might have been suitably substituted for the sunken panels. As many craftsmen are not suitably equipped to produce inlays, it is practicable to use stock inlays, thus simplifying the process and making it possible in the average high school.

Minor Subdivisions of Three Vertical Major Parts or Divisions. In a three-part design, it is the designer's desire to gain the effect of lightness and height by the use of Rule 3b. As a simple treatment of a three-part design, Figure 248 needs little comment. Figures 249 and 250 are examples of dividing by means of minor divisions, the outer sections of a three-part design.

The small drawers in the right and left sections of this figure might have been improved in proportion by again applying Rule 2a to their design, thereby varying the measure of their heights. The enclosed panel enrichment affords pleasing variety to the otherwise unvaried front panels. (7g)

Figures 251 and 252 show drawer runners continuing thru all three vertical sections, thus definitely binding these sections together. It is seen that this device is conducive to unity, whenever two or three vertical divisions have been used.

Figure 252 is a repetition of Figure 251 but shows the echo or continuation of the three divisions of the primary mass into the appendage. The use of the single or double band enrichment still further binds the minor subdivisions of the primary mass into ideal unity with the appendage.

Sequential Progression.

Sequential Arrangement of Minor Horizontal Divisions. Let us now imagine the center section of a three-part design to be removed and extended upward. Its transformation by this process into a cabinet or chiffonier similar to Figure 253 introduces the new principle of *sequential progression.* Instead of adhering to the limitation of Rule 2, this new arrangement shows us that the horizontal divisions may be gradually decreased in height from the bottom towards the top of the primary mass. By this rhythmic decrease in the measure of the height, the eye is led thru an orderly gradation thru lesser areas to the top, thus giving a pleasing sensation of lightness and variety to the structure. By this method also, the large areas are retained at the bottom to give stability and solidity to the structure. A quick test of these conditions may be made by reversing Figure 254, thus producing a more decidedly pleasing effect.

This orderly gradation or sequence of heights need not be carried out with absolute mathematical precision such as 7-6-5-4-3-2-1. Arrangements similar to the following progression make for equally pleasing and more varied effect: 9¼-8-6¾-6-5-4¾. Many designers repeat similar heights for two neighboring horizontal spaces (6-5-5-4¾), but the upward gradation should be apparent. Figure 255, an Austrian motive, shows a strongly marked sequence with the top division broken by Rule 3b. It is better practice to keep such attempts confined to the bottom or top members of the sequence or loss of unity may be the final result.

By applying this principle to the center section of a three-part design, we now have illustrated in Figure

SURFACE ENRICHMENT AND MINOR SPACE DIVISIONS FOR LARGE PRIMARY MASSES IN WOOD ... ACCENTUATION OF M OR VERTICAL DIVISIONS

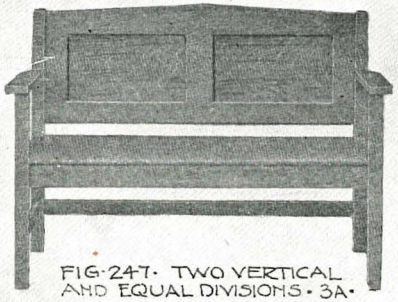


FIG. 247. TWO VERTICAL AND EQUAL DIVISIONS. 3A.

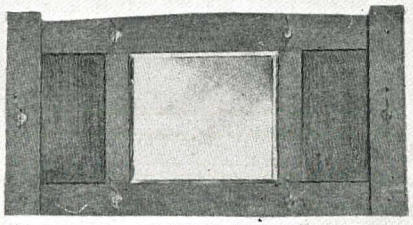


FIG. 248. THREE MINOR VERTICAL DIVISIONS. 3B.

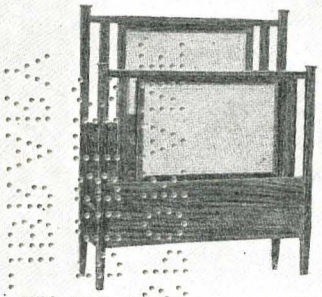


FIG. 249. THREE VERTICAL DIVISIONS. 3B. MINOR 3A

FIG. 250. THREE VERTICAL DIVISIONS. 3B. MINOR. 2A

FIG. 251. THREE VERTICAL DIVISIONS (WITHOUT REPETITION IN APPENDAGE). 4A. MINOR 2A

FIG. 252. THREE VERTICAL DIVISIONS REPEATED IN APPENDAGE. 4C.

Plate 36.

SURFACE ENRICHMENT AND MINOR SPACE DIVISIONS FOR LARGE PRIMARY MASSES IN WOOD

SEQUENTIAL ARRANGEMENT OF MINOR HORIZONTAL DIVISIONS IN ONE OR THREE VERTICAL DIVISIONS

FIG. 253. SIMPLE SEQUENCE FOR SINGLE MASS. 2C.

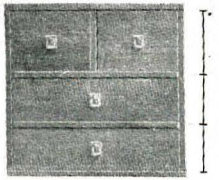


FIG. 254. WRONG MOVEMENT OF SEQUENCE: REVERSE THIS PLATE AND NOTE THE IMPROVEMENT.

FIG. 255. UPPER MEMBER OF SEQUENCE DIVIDED BY RULE 3B.

FIG. 256. SEQUENCE APPLIED TO CENTER MEMBER OF THREE VERTICAL DIVISIONS.

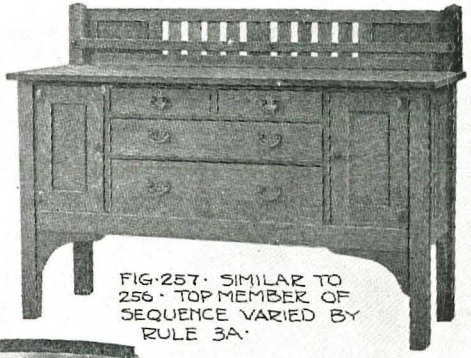


FIG. 257. SIMILAR TO 256. TOP MEMBER OF SEQUENCE VARIED BY RULE 3A.

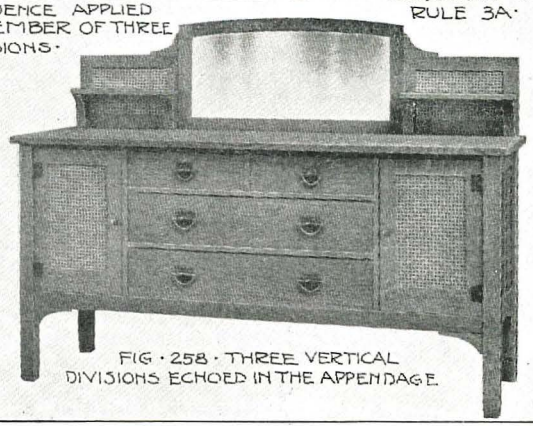


FIG. 258. THREE VERTICAL DIVISIONS ECHOED IN THE APPENDAGE.

Plate 37.

256, the new sequence in its application, and Figures 257 and 258 are variations of the same idea.

Two Horizontal and Three Vertical Divisions. We now come to the transitional type of design where three *vertical* sections begin to lose their dominance as major divisions but still retail their places in the design as minor sections. Replacing these in prominence is the *horizontal* major section or division. The first immediate result of this change as shown in Plate 38 is to produce a more compact surface with a greater impression of length because of the presence of strongly accented horizontal lines which are always associated with horizontal divisions. This transitional style with its minor but dominant horizontal divisions would harmonize with the long horizontal lines of a room or similar lines in the furniture. The full expression of this style or type will be readily seen by comparing Plates 38 and Figures 251 and 252, Plate 36. Several styles of period furniture have been introduced in Plate 38 to prove the universatility of these principles of space divisions.

Figures 259, 260 and 262 are divided by three minor vertical sections cut by two minor horizontal divisions with the dominance in the *lower section* (2a). The arrangement of the small central drawers could have been more varied by the application of the principle of sequential progression. Figures 261 and 263 show similar vertical spacings with a difference in the arrangements of the horizontal divisions. In these figures the dominance has been placed in the *upper section* of the primary mass by the division created by the runner above the lower drawer. It is likewise seen that Figure 263 needs an appendage to bind the top into closer unity of minor spacings.

In carrying the transitional type to which we have referred in the previous paragraphs, from the vertical space influence towards the horizontal, we are gradually approaching *three minor horizontal divisions,* still maintaining three minor vertical divisions in a modified and less prominent form. Figure 264 is an approach towards three horizontal divisions. As only one clear cut horizontal space division is visible, this figure is not a pure example. The upper horizontal space division is broken up into a three-part design by the drawer guides. It is not until we reach Figure 266 that three horizontal divisions are clearly evident.

Horizontal Divisions.

Three Minor Horizontal Divisions Cut by Varying Numbers of Vertical Divisions, Plate 37. The horizontal minor divisions in furniture are generally drawer runners and the vertical minor divisions are often drawer guides. The horizontal divisions may be arranged in either one of two ways, first by the application of Rule 2b or second, by applying Rule 2c, the rule of sequential progression. Figures 266, 267 and 268 are representative of the former while Figures 269 and 270 are typical of the latter. The result in either case is a compactly designed and solid mass of simple structural lines. On some occasions we find the three-part rule used for minor divisions within the horizontal sections while again the two-part rule is used. The method depends upon the desired use and appearance. In either case the long areas and large masses are to be retained as far as possible, near the bottom of each primary mass, as this custom tends to give a sense of solidity to the design.

Figure 271 is a rare reversion to more than three vertical divisions. In this case, Rule 3c has been observed and we find all of the panels are of equal size. Variety has been secured by means of the horizontal spacings.

Free Balance.

Free Minor Space Treatment. This form of design is inherent in the Japanese system. It consists in the planning and balancing of unequal areas over a geometric center. It is not subject to definite rules as is the more formal balancing. The reader is referred to Mr. Arthur Dow's excellent book on Composition for further discussion of the subject. Figure 272 is an example of partly formal and partly free balance and its method of treatment.

Carving and Piercing as Applied to Large Masses. Figures 273 and 274 are pierced designs, thoroly related to the structure and in no way weakening it. Figure 273 is representative of a type which, if carried to extremes, will cause the structure to become too weak for service; it is, therefore, necessary to guard and restrict this form of enrichment. The carving of Figure 275, combined with the contour enrichment forms a pleasing variation to this common type of furniture design.

Small Minor Details of Large Primary Masses. Small minor details in furniture construction should be designed with as much care as the larger major or minor parts. The larger areas or spaces in small details similar to stationery shelves and pigeon holes must harmonize in proportion with the space in which they are placed and of which they are a part.

The three part or three vertical division system, 3b, is generally used to design the small details in furniture as may be seen in Figures 276, 277, 278 and 279, while the rule of sequence, 2c, may be employed again to subdivide these small details in a horizontal direction with as much variety as is consistent with unity. Figure 280 is a leaded glass surface enrichment for doors. Note the leading lines of the enrichment as they parallel the dominant proportions of the panel opening.

Rules.

Rule 2c. Sequential Progression of Minor Horizontal Space Divisions. A primary mass may be subdivided into three or more smaller horizontal masses or sections by placing the larger mass or masses at the bottom and sequentially reducing the height measure of each mass towards the smaller division or divisions to be located at the top of the mass.

Reprint of Rules 2 and 3 as follows:

SURFACE ENRICHMENT AND MINOR SUB DIVISIONS
FOR LARGE PRIMARY MASSES IN WOOD.
THREE VERTICAL DIVISIONS CROSSED BY TWO HORIZONTAL DIVISIONS.

FIG. 259. SHERATON

FIG. 260 ADAM

FIG. 261. SHERATON

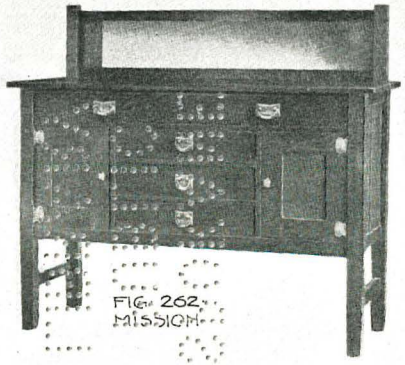


FIG. 262. MISSION

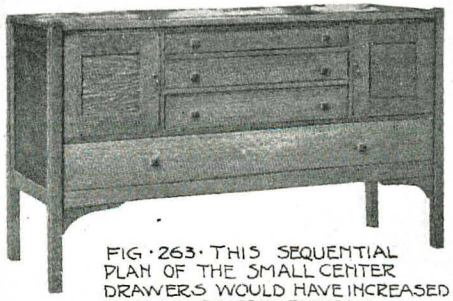


FIG. 263. THIS SEQUENTIAL PLAN OF THE SMALL CENTER DRAWERS WOULD HAVE INCREASED THE INTEREST IN FIGURES 259 TO 262.

FIG. 264. AN APPROACH TO THREE HORIZONTAL DIVISIONS (PLATE) NOTE PANEL ENRICHMENT WITH IN CENTER.

FIG. 265. SEQUENTIAL PLAN FOR TWO DRAWERS.

Plate 38.

SURFACE ENRICHMENT AND MINOR SUB DIVISIONS
FOR LARGE PRIMARY MASSES IN WOOD.
ACCENTED HORIZONTAL DIVISIONS (THREE) CUT BY VERTICAL DIVISIONS.

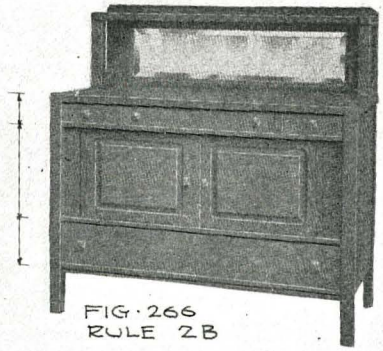


FIG. 266 RULE 2B

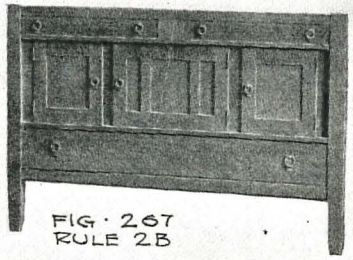


FIG. 267 RULE 2B

FIG. 268 RULE 2B

FIG. 269 RULE 2C

FIG. 270 RULE 2C.

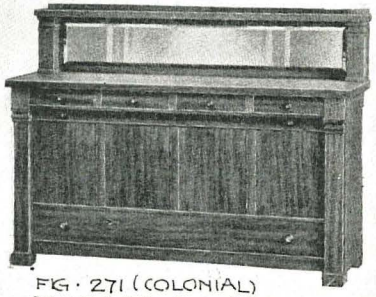


FIG. 271 (COLONIAL) RULES 2B AND 3C.

Plate 39.

Rule 2a. If the primary mass is divided into two horizontal divisions, the dominance should be either in the upper or the lower sections.

Rule 2b. If the primary mass is divided into three horizontal divisions or sections, the dominance should be placed in the center section with varying widths in the upper and lower thirds.

Rule 3a. If the primary mass is divided into two vertical divisions, each division should be equal in area and similar in form.

Rule 3b. If the primary mass is divided into three vertical divisions, the center division should be the larger, with the remaining divisions of equal size.

Rule 3c. In elementary problems, if more than three vertical divisions are required, they should be so grouped as to analyze into 3a, 3b or be exactly similar.

Acknowledgment is made of catalog cuts supplied by Stickley Brothers Company of Grand Rapids, Michigan; M. L. Nelson Furniture Company of Chicago and William Leavens Company of Boston.

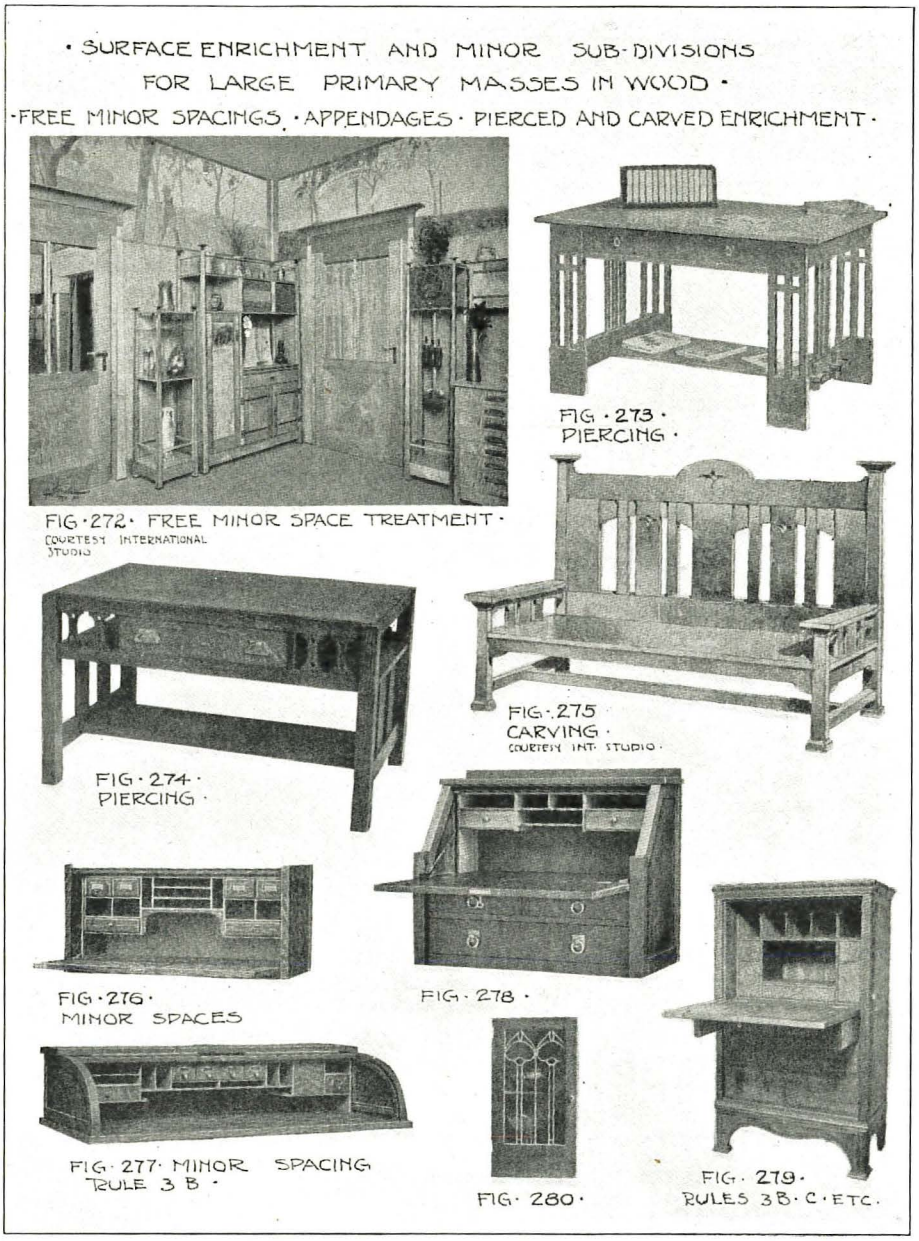


Plate 40.

MANUAL TRAINING IDEALS OF YESTERDAY, TODAY, AND TOMORROW

James McKinney, New York, N. Y.

IN trying to give to Manual Training its proper place in our scheme of education, it will be to our edification to trace out and consider the changing finger posts of education and note wherein they have led and guided the footsteps of the manual training teacher in his quest of the best for the boy. Among the milestones on this road to knowledge and power there is one which has stood the test of the relentless critic of time and remained unchanged; it is that our American school should be truly democratic. Conceived and dedicated to give equal opportunity to all, our school from the beginning gave forth its slogan of an open door to all the children of all the people; but so eager were our fathers to carry out this democracy of the open door to knowledge, that special effort was made to make the course of study equal and the same for all. The idea was to provide each child with a latch key to the many mansions of knowledge (not a child's key, but a man's key, to be used when he put away childish things) and in this effort to give each child the same kind of a key the school very often failed to notice whether the child was being instructed in how to *use* the key. America has always been proud of her public schools, and justly so, but that fact does not place the school beyond the pale of criticism. To interpret the idea of a democratic school as giving all children the same kind of an education is a false ideal. Our psychologists are proving to us that all children are not equal. Tacked on to the ideal of Democracy in Education was the other ideal of Culture—a culture based on the classics and a false ideal of Democracy.

Such was the soil—the soil of yesterday, that the first seeds of manual training tried to take root in. Its growth will show how stony the ground was. How Manual Training managed to wedge itself into the hard set and fixed ideas of education is common knowledge to us all, and were I to quote from Prof. Runkle or Dr. Woodward, and other pioneers of thirty years ago, I think you would recognize a rather modern note in their plea. The criticism which we place upon their work today concerns mostly with the practical application of their theory. The period will always be known as the block exercise period. Tool process or technique was its main end, but this alone would never have been a sufficient aim to satisfy our school masters of 30 years ago. Therefore it was necessary to pad and bolster it up with ideas which had all the earmarks of the pedagogical fashion of the period. Therefore we behold our Manual Training enthusiasts cutting their cloth according to the fad which Miss Pedagogy proclaimed trite and right, namely, Discipline and Culture, and so we find much speaking and writing devoted to the gentle art of making (not enemies) but friends of these two watchwords of education. It was held that the logical sequence of tool process was a splendid thing for developing reasoning and that the power of observation got from noticing when you planed against the grain, could be applied to all other phases of your life work. Then there was the fine ethical training developed in the ability to make a square corner and measure twelve inches. These things were facts and if you made a mistake the lie would always be staring you in the face, and your conscience (if you had one) would so prick you that you would be compelled to take a thought about improving your conduct. There is perhaps little use in arguing about the fallacy of these ideas, but it has been the writer's experience to have dealings for many years with men who were very skillful in making square corners, and he cannot say that their conduct was any better or any worse than the rest of human kind. One thing, however, demands all honor and thanks to these early workers. They established for all time a hand and eye training as a part of our general scheme of education. This they settled, and we can easily forget all the other trimmings which are irrelevant to it.

In my study of the growth of the Manual Training idea I have been unable to find out whether the boy or the educator first became tired of making square blocks and abstract joints. However, with the coming of the Sloyd idea to these states, one and all recognized that someone had blundered in the selection of the manual training course of study. The inception of Sloyd must have been a godsend to the boy for it gave him the chance to make something (and what is a workshop and tools for anyway). As you know Sloyd took up the disciplinary values and the tool process and technique of the block period and applied them to making something useful (the useful articles being Swedish wooden spoons, scoops, etc., which somehow this American democracy did not assimilate). Sloyd, however, became thoroly climatized in this matter of models and has played an important part in the development of the Manual Training idea. Its teaching is based on good pedagogy and the only quarrel that I personally have with it is the "woodenness" of its content.

So much for the dim ideas of yesterday. Let us approach the problem of today in broad day light. Among the many social institutions which are coming under the glare of popular magazine criticism, we find the public school cringing under the limelight of exposure. The educational household gods are being undermined and ruthlessly pulled down. This vituperation of the school which is being blazoned abroad is no new thing. The boy, at least, has always criticized the school, and we are just beginning to have the good sense to respect his criticism. Some ten years ago the culture idea began to get its wings clipped, and some daring ones began to explain that Latin, Greek, mathematics or literature were only vases or receptacles of a certain essence of culture; that real culture has its foundation in the sum total of socialized results of human endeavor,

and that it was not our work but our attitude towards our work that measured the cultural value of our job. Then came the new psychology which threw to the winds our pet ideas of certain studies and their values in discipline, and the report of the Douglas Commission of Massachusetts which disclosed the waste in our educational system; the conception of the National Society for the Promotion of Industrial Education, etc. All these factors have been hammering at our doors and forced us to open them to greet a new ideal. Our watchword is no longer formal discipline and culture but the larger and truer democratic idea of the socially efficient citizen —the citizen who will not only bear his own weight, but will appreciate the load that his neighbor is carrying and when needed will joyfully help him to make it lighter. The old ideal was the *value* of a disciplined mind; the new ideal considers the *worth* of a personality. With this new ideal of linking the school with society outside the school you will readily see how the old conception of Manual Training is making a misfit. Here is part of the criticism which the Douglas Commission makes on Manual Training. This was published in 1906 but I think you will allow that it is still fair and true in a measure in the year 1915: "It (manual training) has been urged as a culture subject, mainly useful as a stimulus to educational effort—a sort of mustard relish, an appetizer to be conducted without reference to any industrial end. It has been severed from real life as completely as have other school activities. Thus it has come about that the overmastering influence of school traditions have brought into subjection both the drawing and the manual work."

This statement is a strong one but it undoubtedly expresses the just criticism of much that has been done in the school under the name of manual training, and altho we may be inclined to take exception to the sweeping nature of the indictment we can readily accept the spirit of it. Manual Training teachers in the past have invariably been urged to rest the philosophy of their work upon the disciplinary and formative values and to give comparatively little thought to the subject matter. This they have done in large measure and in so doing have as largely lost the vision of their part in our educational scheme. What then is the vision of our job? What is the part we shall take in the new ideal of education—an education which prepares for life, and life in the terms of consumption and production. In taking the point of view that general education is concerned with intelligent consumption of material and spiritual things, and that vocational education is concerned with the intelligent production of material and spiritual things, the writer is aware that eminent authorities in education, men like Dr. Snedden and Dr. Bagley, are at odds on this question, and while there may be no such hard and fast division of one's qualities and powers, these ideas, namely, consumption and production are playing a large part in any discussion of the new social order, and the part that we shall play in this growing social ideal, will largely depend upon how intelligently we have been prepared to share in both according to the fullness of our natural abilities. In order then that our boy shall intelligently consume the good things of the world around him, (a world in which he is intensely interested) we must grasp the fact that manual training means not only a method of teaching, but something to be taught, and that something is that message which Prof. C. R. Richards gave us many years ago: "It is our opportunity and responsibility to identify ourselves as the representatives in the school of this great field of human activity, and to take for our task as teachers the interpretation of the arts and industries of modern life." But how does this work out in practice you ask? Where shall it start, and where shall it end? When does it cease to become Manual Training and when does it become Vocational Training?

The larger part of our work should be in the elementary school, and long before the question of vocation should come up in a child's life. It is helping to develop individuality and power to discover aptitudes and interests, and goes on as long as the vocational choice (if it be an industrial choice) of the individual is held in abeyance. Its function therefore may terminate in the elementary school; at the end of the High School, or at the completion of a college career. The child who has made his own toys and peopled his own make believe world with them; the boy who has made his kites, his boats, his sled, his simple telegraph instruments and his sun-dial; the boy who has built a bridge, made a water wheel, electric motor, or steam engine, who has built a model house in wood and concrete, or worked at printing, or who has studied and worked in a small way in some of the local industries, is surely richer for the experience. In working with this great variety of materials there is a motive which has the boys' inherent backing and has brought into play all the factors which make a piece of constructive work educative.

1. There has been a need (a boy's need) met in a real way.

2. There has been a growth of images thru modifying, expanding, and defining the project or image in the light of reports brought in by the sensor.

3. Something has been planned and something done. There has been learning thru doing.

On the social side it will help to make him a more intelligent consumer of the other fellow's service and good things. It will give him an inkling into the life and labor of industry and provide a real vocational "try out." It is my thoro conviction that if Manual Training had taken hold of this task with enthusiasm, much of the work that is now being done in the prevocational school, could have been done in our regular Manual Training workshop. To some of you this inkling into so many things will well seem to develop the "jack of all trades" but those who have tried this type of work have no apologies to offer for the result. On the other hand we feel that the elementary school workshop, (fitting in a scheme of general education) should have no such narrow function as training all boys to be woodworkers. The specialization, the standardization, belongs to the Vocational School in its many different phases, and we surely do not want manual training narrowed and deadened by the very things from which the other subjects of

the school are trying to free themselves, namely, high school and college requirements, (which often, like the flowers that bloom in the spring, have nothing to do with the case).

In summing up the present day situation it will be to our profit to consider a moment a statement or creed of Manual Training which was drawn up at the Convention of the Eastern Arts and Manual Training Teachers' Association which was held at Atlantic City in 1914. We may not agree with all its principles, but it will at least give us some common ground to stand upon.

I. Manual Training is an essential part of a general scheme of education.

II. The child's relation to the social world is the important factor determining the character of the work for different ages. To understand the social world and needs of the child at different ages is the heart of the educator's problem.

III. The experiences given the child in school should be so comprehensive that individual characteristics may be developed. A vital part of these experiences is represented by the manual training factor.

IV. Actual experience in productive activity as contrasted with mere information getting, must continue to be the distinctive feature of the manual arts work in our schools. In addition, the practice of the manual arts will provide, for all ages concerned, distinctive subject matter and method of instruction.

V. The great practical problem is to see to it: That all motor activity is enriched with idea and image; that all technical power is supplemented by social insight; that both the art and science of industry are represented; and that not only the practical and the industrial but also the humanistic significance of the manual arts be expressed in our school workshops.

VI. It is clear that these considerations involve more than the manual arts teachers, demanding effective cooperation in all departments of the school, and include much in the subject matter of other branches of the curriculum. The information which can appropriately be considered the business of the workshop is that which relates to or depends upon technical practices.

VII. To meet the foregoing requirements and place the manual arts on a basis where they will produce adequate educational results, they must be given (1) an increased industrialized subject matter and meaning, not limited to local industries, and (2) an increase of time which will provide adequate experience and opportunity to realize the results desired.

It may seem strange that it has taken thirty years to get the Manual Training people of the country to get together and make an attempt to form a professional standing. It is to our shame that we have worked so long in a general disjointed fashion, the right hand of the east not knowing what the left hand of the west is doing, and we ought to welcome the attempt to form a platform for manual training which will work in harmony with the new idea in education. In this present day awakening, with the industrial idea paramount, with the early specialization, it behooves us to question the watchman on our educational tower and ask him "What of the night?" The prophet of old has told us that where there is no vision, the people perish, but to lift our eyes from this struggle of the old with the new, and forecast the future, is the work of a prophet. We can only indicate some of the possible things that seem to loom up in the future. We have just begun to understand the child and his problem, and we shall need continued study of his aptitudes, capacities, and interests. The course of study requires a revision for simplification. We are trying to cram too many things into our elementary school child. We shall have to face the question whether it is the function of the elementary school to prepare *all* its children for the high school. With regard to Manual Training, I feel that the industrial setting has come to stay. This does not mean there shall be no provision for work which has its center of interest in the home or a purely craftsman point of view, but it means that our methods will more nearly approach those of industry or the craft workshop. If we are to do our share in producing better citizens faithfully, we shall be forced to give up much of our stupid mass instruction, with an active teacher and a passive class, and give more attention to the idea of developing the natural powers of each child. One factor, however, we must admit and prepare ourselves for making a bold stand on the question. We cannot do adequate work on 60 minutes or even 90 minutes time per week, and we shall never be able to show or satisfy the public who demand a dividend on their money, unless we get more time for our work. One can also see indications of a better trained teacher, and our man to be a success in this work must be the born teacher with a pedagogical training, and it will be to his advantage to have gotten his practical training in the workshops of industry.

Our great problem, however, will always be our subject matter and I cannot help prophetizing that it will become more and more industrialized. This does not mean that our school workshops must become commercial machine shops or patternmaking shops, or anything of that ilk involving large and needless expense on the community. There is a snare and a real danger in saying we can give the "Fundamentals" of all trades in prevocational training. What we can do is to give a world of varied experiences, which will develop individuality, responsibility, and a desire to remain longer in school. One of our biggest pleas for industrial training is based on the lack of the old farm bred boy's opportunity for tinkering and dealing with real things, and where school shops have been fitted out according to the cut of commercial shops, there is a danger of the work losing its function of sampling things and running entirely on a basis of producing articles in quantity without much question as to their value for meeting a boy's needs. I have no quarrel with specializing in machine shops or any other kind of work when the occasion seems fit, but we can question the advisability of settling too soon what a boy's special aptitudes are.

The condition of one teacher trying to teach thirty or more boys with an equipment designed for twenty, has been one of the causes for much of the criticism directed against Manual Training. Work done under such conditions must necessarily always be crude.

Given adequate time (at least two hours a week) the writer is certain that the properly trained Manual Training teacher can do all the pre-vocational training needed for any boy. From the camp of the enthusiasts of vocational education we hear rumors that the days of manual training are being numbered. This, however, is not so. On the other hand we feel that Manual Training can, and should become, the handmaid of all true vocational training and has at last just got the vision of its permanent place in our scheme of education; a place which is no longer thought of as an appendix or marginal fringe, but which is now considered as important and essential as any of the historical three R's.

SEWING FOR THE GRADES

Annetta B. Cooper and Janet G. Cation, Normal, Ill.

(Second Article)

Course of Study for the Sixth Grade.

Problem	*Article*	*Time*	*Supplementary Problems*
Overhanding French knots	Bag for crochet	3 weeks	
Crochet stitches	Crocheted edge on washcloth Crocheted lace for night-gown	9 weeks	Slippers Needle book
Seams Band Feather-stitched hem Buttonholes	Flannelette petticoat	12 weeks	Bathrobe Eiderdown slippers
Darning	Stocking	1 week	
French seam Facing Overhanding lace	Kimona night-gown	11 weeks	Combing jacket

Sixth Grade Problems.

Crocheting	Plain slip	Collar protector
Patching	Sewing bag	Book cover
Underskirt	Baby's petticoat	Pillow top
Hemstitched towel	Holder	Napkin hemming
Doll's clothes	Nightgown	Doily
Underwaist	Dress cover	Bag for crochet
Drawers	Knitted muffler	Crocheted slippers
Bathrobe	Guest towel	

How to Present a Sewing Lesson.

The Sewing lesson should have as definite a plan as the geography or the arithmetic lesson.

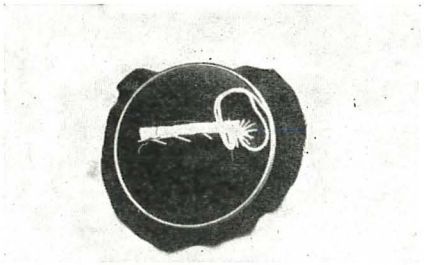


Fig. 1. Illustrative Material for the Buttonhole.

It is well to write the plan, as the teacher is then more likely to cover all of the points and to present the lesson more logically.

Form for the plan.

I. Subject.
II. Teacher's Aim.
III. Pupil's Aim.
IV. Materials.
  (a) To be used by pupils.
  (b) To be used for illustrative purposes.
V. Organization.
VI. Preparation.
VII. Presentation.
VIII. Summary.

We shall consider a lesson on Buttonholes, which ordinarily is not liked, but which may become quite interesting in the hands of an ingenious teacher.

I. Subject: Buttonholes.
II. Teacher's Aim: To teach the making of a buttonhole.
  To teach neatness thru the use of buttonholes.
III. Pupil's Aim: To make a buttonhole.
IV. Materials:
  For pupils.
  Muslin 3″ x 5″.
  Number 8 needle.
  Number 40 thread.
  Buttonhole scissors.
  For illustrative purposes.
  Black worsted 10″ x 10″.
  White muslin 10″ x 10″.
  White yarn.
  Large embroidery hoops.
  Some well-worked buttonholes.
V. Organization:
  (a) Cutting.
  (b) Overcasting.
  (c) Buttonholing first side.
  (d) Fanning the end.
  (e) Buttonholing the second side.
  (f) Finishing other end.
VI. Preparation.

When the children have finished the belts on their petticoats, let them enumerate the ways of fastening them. They will suggest pins, hooks and eyes, buttons and buttonholes.

Write these suggestions on the blackboard, listing the advantages and disadvantages of each in separate columns.

Buttons and Buttonholes.

Advantages.	Disadvantages.
Do not rust.	Hard to make.
Neat.	
Last longer.	

Hooks and Eyes.

Advantages.	Disadvantages.
Easy to sew on.	Apt to rust.
	Apt to bend.
	Apt to come off.

Pins.

Advantages.	Disadvantages.
Quick.	Not neat.
	Apt to come off.
	Apt to stick fingers.

The children will decide unanimously on buttonholes.

VII. Presentation.

Pass around some well worked buttonholes. Let the children observe:

(a) How close to the edge they are cut. (⅜ inch.)
(b) How they are cut. (On a thread of the goods.)
(c) How many thicknesses of cloth they are worked thru. (Two.)
(d) How far apart the finished edges are. (Together.)
(e) How deep the stitches are. (About ⅛ inch.)

(f) How the corners are finished. (Fanned.)

Since, if there is any strain on the buttonhole it will come on the corner nearest the fold, that corner must be made as strong as possible. Therefore show the children that it is necessary to begin in the lower corner farthest from the fold.

After cutting, the first process is overcasting.

By questioning the children, we get the reasons for overcasting:

1. To keep the edges together.
2. To keep the edges from raveling.

For illustrative purposes, place a piece of black worsted, lined with white muslin, in a large embroidery hoop, and with darning needle and white yarn demonstrate with large stitches, each stitch, before the children begin.

Be sure that the thread is long enough to make the entire buttonhole.

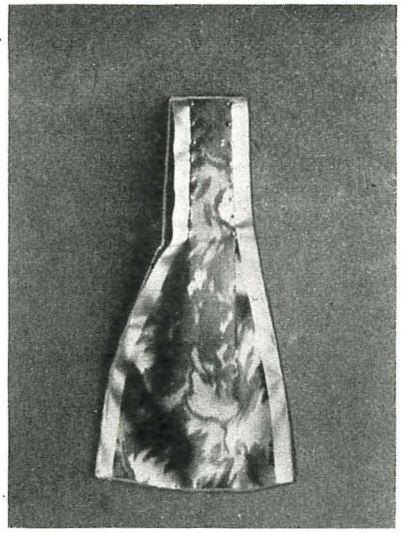


Fig. 2. Bag for Crochet.

Fasten the thread in the usual way. Take three overcasting stitches across each side 1/16 of an inch deep. Bring the needle back to the starting point.

Buttonholing:

Put the needle thru perfectly straight; take the thread from the eye of the needle, throw it over the needle from right to left; pull the knot thus formed to the edge of the buttonhole.

In order to keep the buttonhole from tearing out, put several stitches around the corner. These stitches radiate and look like an open fan, so we call this process fanning.

Now buttonhole the other side, being careful to keep the edges together.

Fan the second end and fasten the thread on the under side.

VIII. Summary.

At the end of the lesson have a brief summary, writing on the blackboard the points emphasized in the lesson:

(a) Buttonholes should be cut 3/8 of an inch from the edge.

(b) They should be cut on a thread of the goods.

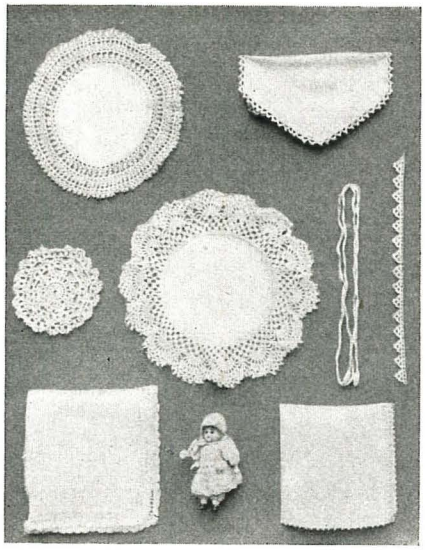


Fig. 3. Supplementary Problems in Crochet.

(c) They should be worked thru two thicknesses.

(d) The edges should be together when finished.

(e) The thread must be long enough to make the entire buttonhole.

It will be necessary to have several drill lessons on buttonholes before the girls are ready to put them on their petticoats.

Bag for Crochet.

French knots — Review overhanding — Review French seam.

Materials:

20 inches ribbon 5 to 6 inches wide.
San silk in color.
Silk thread in color.
Number 8 crewel needle.
Number 8 needle.

Method:

Find the center of the length of the ribbon and measure 3½ inches each way. Find the middle of the

Fig. 4. Towels with Crocheted Borders.

width of the ribbon and crease to these points. Measure ½ inch each side of crease and fold to the border. Pin and baste. Fasten down with French knots ½ inch apart.

Make a French seam across the ends of the ribbon. Overhand the edges of the ribbon 4 inches from the bottom.

Directions for French Knots:

Fasten the thread on the under side. Bring the needle up to the right side and hold it flat against the cloth, with the middle of the needle against the thread. Wrap the needle around the thread three times, draw it back and put it thru the cloth close to the point where the thread is drawn thru.

Fig. 5. Flannelette Petticoat showing inside finish of seams.

To Crochet.

Hold the thread around the little finger, under the second and third, and over the first finger of the left hand. The end of the thread should be between the thumb and second finger.

Point the needle downward on the left side of the thread, then turn it upward from right to left. Hold the loop thus formed between the thumb and second finger.

Make a chain stitch by putting the needle under the thread from left to right, catching the thread on the hook, throwing the thread and drawing it thru.

A slip stitch is formed by putting the needle thru the stitch or loop, throwing the thread and drawing it thru both loops.

A single crochet is made by putting the needle thru a chain stitch or loop, throwing the thread, drawing it thru the chain stitch, throwing the thread a second time and drawing it thru both loops.

A double crochet is formed by throwing the thread once, putting the hook thru a chain stitch; throwing the thread, drawing it thru a chain stitch; throwing the thread again, drawing it thru two loops or chains; throwing the thread again and drawing it thru the last two.

A triple crochet is formed by throwing the thread twice around the needle and then proceeding as in the double crochet.

Abbreviations.

c or ch—chain.
s s—slip stitch.
s c—single crochet.
d c—double crochet.

Fig. 6. Flannelette Petticoat.

t c—triple crochet.

Practice crochet.

ch 36, s s 36, s c 36, d c 36, t c 36, taking an extra chain at each end.

Mile a Minute.

(For Edge of Nightdown.)

Materials:

D. M. C. number 50 (white).
Steel hook number 10.

Method:

ch 10, d c into 4th stitch from beginning, ch 2, d c into 4th stitch from beginning, repeat, making 4 doubles in the same place. *Ch 2, d c into the first stitch. Ch 5, turn, d c into middle hole, ch 2, d c into middle hole. Repeat, making 4 doubles in the same hole. Ch 5, turn, d c into middle hole. Ch 2, d c into middle hole. Repeat, making 4 doubles in the same hole. Repeat from *.

Edges for Wash Cloth.

Materials:

Hemmed wash cloths.
San silk in white or color.
Steel hook number 10.

Method for one edge:

Row 1—S c all around the edge of the cloth keeping stitches close together.

Row 2—Ch 5, s c into cloth ¼ inch in advance. At the corners place 3 stitches in the same hole.

Row 3—Place 8 s c in the first loop, 4 s c in the second, ch 5, s c in middle of first loop, s c 4, ch 3, s c 4, s c 4. Repeat row 3.

Method for another edge:

Row 1—S c all around the edge of the cloth keeping the stitches close together.

Row 2—Fasten the end of the thread in the wash cloth, ch 1, d c ¼ inch in advance. At the corners place 3 stitches in the same hole.

Row 3—Same as 2nd only d c in each loop, or just over the d c.

Row 4—Five d c in first scallop, 1 s c in 2nd, continue all around.

Flannelette Petticoat.

Flannel seams—Putting on band—Featherstitching—Buttonholes—Stitching stitch.

Materials:

2 lengths of flannelette.
Muslin for belt 2½ inches wide and 2 inches longer than the waist measure, cut on the length of the material.
White thread number 50.
Needle number 7.
San silk in color.

Method:

To cut:

Fold one length of flannelette in the middle bringing selvedges exactly together. From the fold measure across 3½ inches at the top and 6 inches at the bottom. Fold on the line which would connect these points and cut. This gores the front and sides, making less fullness at the top and more at the bottom.

To sew: 1—The Gores.

Pin the gores together, placing corresponding notches as in diagram together. Baste with even basting stitch and sew with combination stitch. Press seams open and catch stitch them on both edges.

2—The Placket.

In the center of the back width, at the top, cut a slit 8 inches deep. On the left side make a ¼ inch hem tapering it at the bottom. On the right side make a ¾ inch hem. This forms the overlap and the ¼ inch hem the underlap. Put a row of stitching stitches across the bottom.

3—The Band.

Gather the top of the petticoat from the center of first gore to the placket hem on each side. Pin the middle of the belt to the center front on the wrong side of the skirt. Pin ends of belt to the placket hem, allowing ¼ inch to project. Draw up the gathering thread to fit the belt, distribute gathers evenly, pin and baste making a ¼ inch seam. Sew with the combination or stitching stitch. Turn down and crease ¼ inch from remaining edges. Fold the long edge of band to the right side of the garment so it just covers the stitching previously made. Pin, baste, and hem. Overhand ends.

4—The Buttonholes.

General Rules for Buttonholes.

1. The hole should be cut with buttonhole scissors ⅛ inch longer than the diameter of the button, and lengthwise of the band.

2. Work from right to left holding the buttonhole horizontally over the first finger of the left hand.

3. Begin at the lower right hand corner, and overcast the raw edges with stitches 1/16 inch deep. Do not overcast around ends of hole.

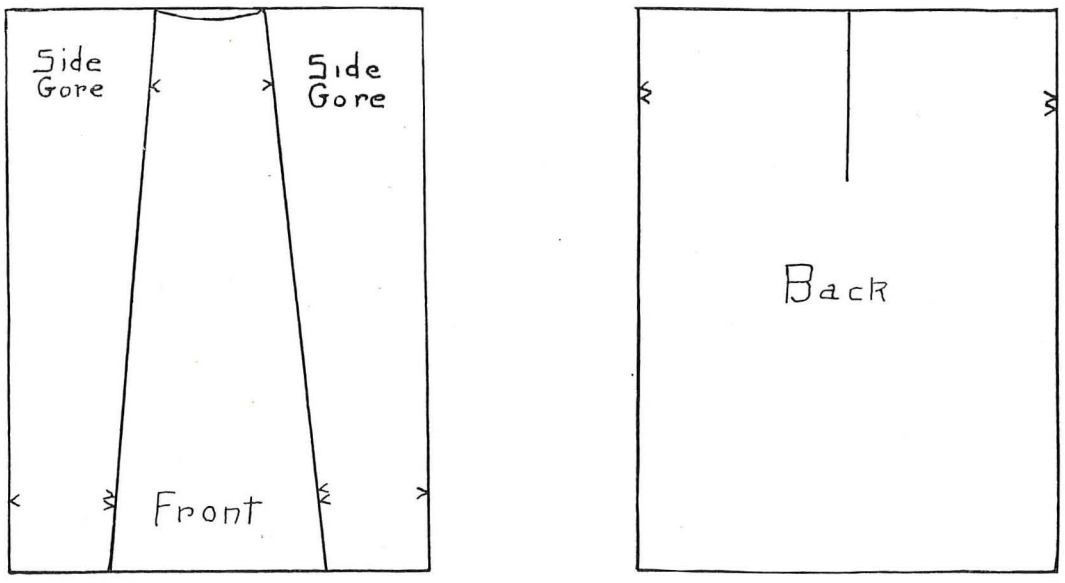


Fig. 7. Pattern for Flannelette Petticoat.

4. Use a thread of sufficient length to do the overcasting and the buttonholing. As soon as the overcasting is done, without breaking the thread, buttonhole the edges.

5. Hold the edges of the buttonhole together so they will be close together when finished.

6. Buttonholes should be firm and neat, never ragged looking.

Directions for Fanned Buttonhole.

Hold the band so the end is to the left and the edge of the hole to be worked is at the top.

Having overcast the edges the needle is put down over the edge of the buttonhole and brought out about ⅛ inch below, being pushed thru one-half the length of the needle. The double thread at the eye of the needle is put around the needle from right to left. The thread is drawn thru and up tightly. The stitches should be very close together but not bunchy. At the first corner have the stitches on the outside spread like a fan. To fasten the thread have it run along on the wrong side under the stitches.

Directions for Stitching Stitch.

Fasten the thread on the wrong side of the work and bring the needle to the right side. Hold the work over the first finger of the left hand. Sew from right to left. Take a stitch ⅛ inch back on the right side and ¼ inch long on the wrong side. Place the needle where the thread first appeared on the right side and take another stitch ⅛ inch back on the right side and ¼ inch on the wrong side. Point the needle over the left shoulder.

Directions for the Feather Stitch.

Fasten the thread and bring the needle to the right side. Hold the work over the first finger of the left hand. Throw the thread to the left, take a small stitch diagonally across the warp and woof threads of the material and catch it in the loop of thread. Throw the thread to the right and make the same kind of stitch on the right side. The size and relation of the stitches should be uniform.

Directions for Catch Stitch.

Fasten the thread with a few small stitches and bring the needle to the right side. Hold the work over the first two fingers of the left hand. Work from left to right, beginning at the left of the material. Point the needle directly toward the worker, take a stitch ⅛ inch long at the left edge of the space to be worked, then another at the right edge of the space, and continue in this way. The stitches at the left edge should be midway between those at the right edge.

5—To Sew the Button On.

Lap the right end of the band over the left end as planned. Insert the needle, carrying a double thread, at the end of the hole nearest the end of the band. Bring the needle to tight side of band and take two small stitches to fasten thread. Place the needle up thru one eye of the button and down thru the other, then thru the band close to the first stitch. Before drawing down firmly place a pin on top of the button and under the thread. Sew up and down over the pin, filling the holes. Remove the pin and bring the needle to the under side of the button. Wrap the thread around the threads holding the button two or three times and fasten with a few small stitches.

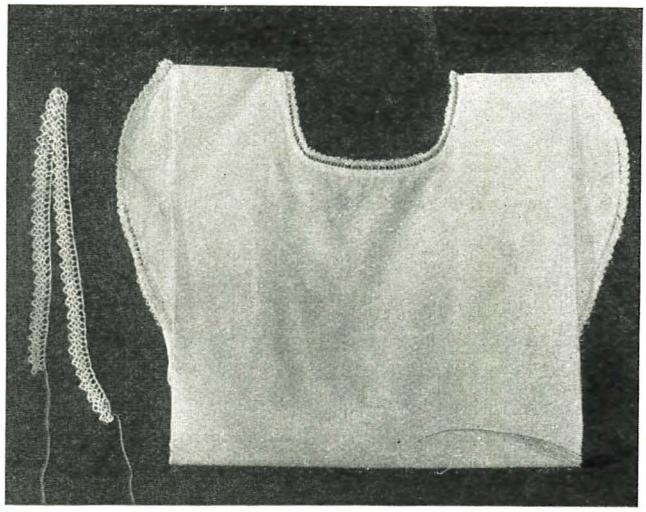


Fig. 8. Kimona Night Gown and Detail of Lace.

6—The Hem.

Even the length at the bottom, turn a 2 inch hem, baste and featherstitch on the right side.

General Rules for Darning.

1. A darn should be smooth, loose, close, soft and without knots.

2. It should be on the right side with the warp threads running parallel with the ribs of the stocking.

3. The warp threads should be very close together.

4. The thread should be of the same material as that to be darned.

5. Leave very small loops at each end so that the darn will not draw.

6. In putting in the warp and woof threads go over and under the edges alternately.

7. Begin to darn at the upper right hand corner.

Stocking.

Materials:

Stocking, preferably with hole in the leg.
Cardboard.
Thread number 40.
Darning cotton.
Darning needle to suit thread or crewel needle number 5.

Method:

Insert the cardboard into stocking, stretch the stocking over it and sew it to the board with the thread to hold work. Cut off the hard curled up edges. Begin at the upper right hand corner ¼ of an inch from the edge of the hole. Put in the warp threads using a small running stitch and allowing them to project ¼ of an inch beyond the edge of the hole. Put in the woof threads beginning ¼ of an inch from the edge, weaving over and under the warp threads, and allowing them to project ¼ of an inch beyond the other edge.

Kimona Nightgown.

Materials:

3 yards cambric.

2 yards crocheted lace: 2 strips 18 inches long; 1 strip 36 inches long.

Number 70 thread.

Number 7 needle.

1½ yards bias lawn tape.

Method:

To cut:

Fold material in center lengthwise, and also in center crosswise. Put the parts of the pattern marked "On fold" on the lengthwise, and crosswise folds of the material, and cut.

To sew:

Pin and baste the under arm seams. Make a French seam, using the running stitch for the first seaming, and the combination stitch for the second.

To finish the neck:

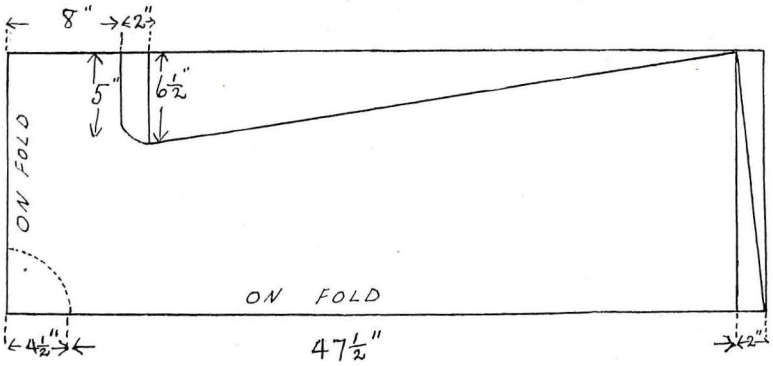
Open one fold of the bias tape. Baste it to the neck of the gown on the right side with edges even. Sew along the crease with the combination stitch. Clip back to the stitching at intervals of one inch in order to allow the edge to spread when facing is turned back. Turn the facing back on the wrong side, baste and hem.

Put a ¼ inch hem in the bottom of the sleeves. Overhand the lace on the neck and sleeves, and overhand the ends of the lace together.

Even the length around the bottom, leaving 2½ inches for the hem. Baste and hem.

Table Showing Cost of Articles for Sixth Grade.

Article	*Material*	*Per Yard*	*Cost*	*Total Cost*
Crochet bag	20 inches ribbon at.....	$0.25	$0.14	$0.14
Washcloth	San silk.			
Crocheted lace	Washcloth at	.05	.05	
Kimona gown	1/10 ball crochet cotton			
Flannelette	at	.20	.02	
petticoat	Crochet hook at	.05	.05	.12
	½ ball crochet cotton at.	.20	.10	.10
	3 yards muslin at.....	.15	.45	
	2 yards lace at.....	.05	.10	.55
	½ yard flannelette at...	.10	.15	
	San silk thread.....		.01	.16



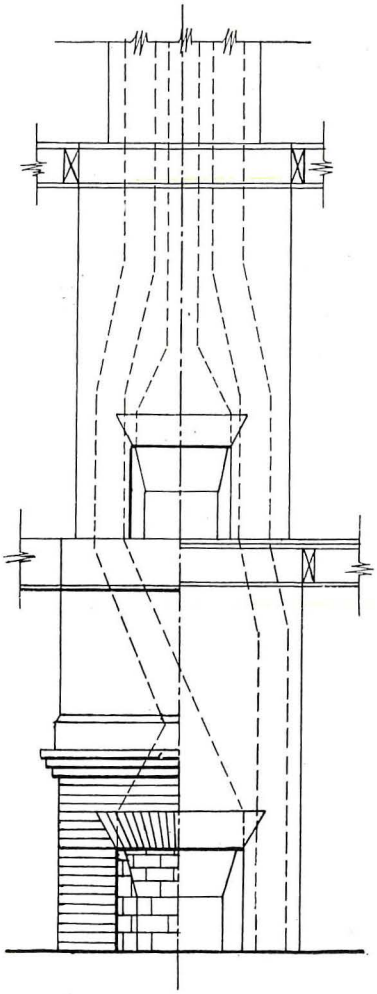
Night Gown Pattern.

"BRICK LAYING---AN INDUSTRIAL ART"

Wm. T. Gohn

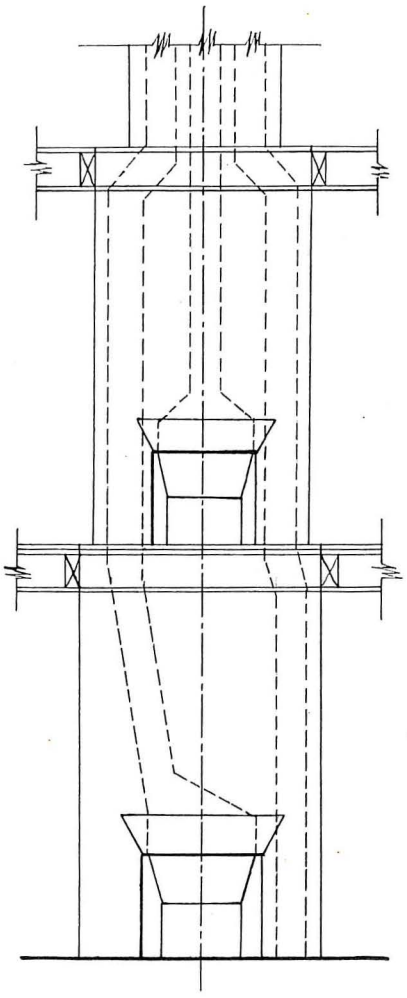
(Sixth Article)

FLUES and Chimneys. The initial considerations in the planning of chimneys are the number, the size and the arrangement of flues. For stoves and small furnaces, used in the bungalow and cottage style of houses, the minimum size of flue should be 8″ by 8″, but if the furnace is large it is better to have an 8″ by 12″ flue, or even 12″ by 12″ flue. Of course the size of the furnace flue depends largely on the amount of radiation, calculations for which may be obtained from any handbook of the building trades.



Proper.

Fig. 1.



Improper.

Fig. 2.

A practice long in vogue in this country, but now quite obsolete, was the building of flues only four inches wide. This was done chiefly to prevent the projection of the chimney into the rooms of the dwellings, thus causing unsightly breaks in the wall surface. Smoke in its ascent takes on a spiral motion; thus we can readily see the disadvantage of a narrow flue. Narrow flues are easily choked with soot, causing poor draught, and they are hard to clean. Hence a general rule should require that flues be not less than eight inches in the least dimension.

Flues should always be lined with some fireproof material, in fact, the building laws of all large cities require it. In these cities the flue-lining is usually of terra-cotta tile. Galvanized iron pipes are sometimes used but are not recommended because of their liability to rust. In the rural districts it is quite customary to plaster the inside of the flue. This process is known to the trade as "parquetting." This is somewhat dangerous, as in time the mortar will drop off.

In localities having a building code it is required that the exterior walls and the masonry partitions between two or more flues in the same chimney be not less than eight inches thick, providing no refractory flue lining is used.

In case it becomes necessary to change the direction of a flue at any place, the diversion should be effected by long slants (Fig. 1) and not by sharp angles (Fig. 2). Angles not only cramp the area of the flue, but also form

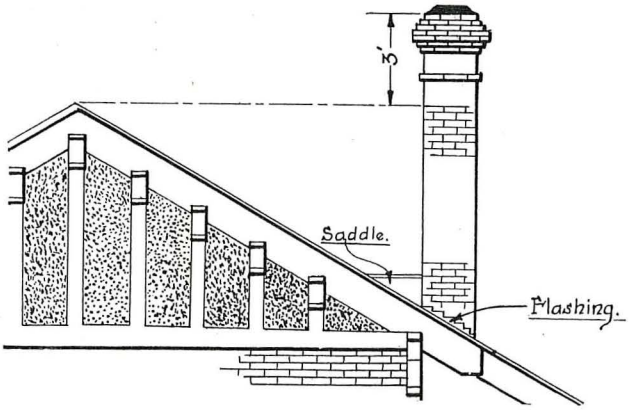


Fig. 3.

ledges or shoulders which catch dropping mortar and pieces of brick, thus increasing friction and choking an otherwise good flue.

The height to which chimneys should extend above the highest point of the building in which they are constructed, or those adjoining, should not be less than three feet, nor seldom more than four and one-half feet. (See Fig. 3.) If the chimney is not extended to this height, the reversible top or cover with one or two open sides (may be of service in preventing back draught). but such a cover is unsightly and should be avoided if possible.

When the tops of outside chimneys stand clear above the eaves of the roof for more than ten or twelve feet they should be stayed or braced to the roof with iron rods. The rod used should be anchored thru at least one side of the chimney, near the top and braced to the roof with the end splayed as far as possible at the point of juncture with the roof, in order to give a measure of lateral support to the chimney.

The top of a chimney should be covered by a stone or concrete slab, either solid to prevent the entrance of rain—the smoke passing out thru the sides just under the cap—or with a slab having a hole, the size of the flue, cut into it. This prevents disintegration of the exposed mortar joints. These stone caps should be carefully measured to be sure that they are of the exact size; that the holes for the flues are large enough; that they are of the proper shape, and placed in the proper position.

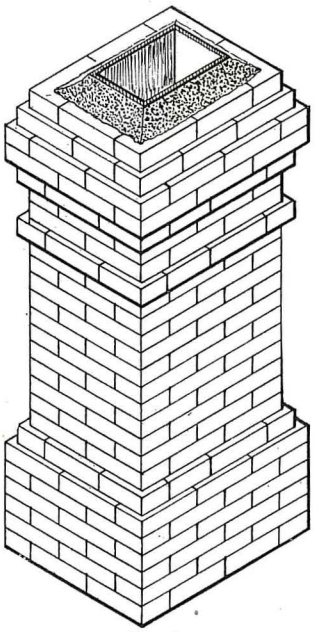


Fig. 4.

Where flue linings are used they should extend from two to six inches above the cap or top course of the chimney, having a coping about them slightly tapering upwards and toward the center of the flue. (See Figures 4 and 5.)

All chimneys should be constructed of well-burned, and good, sound, hard brick. Bricks which are soft or shaky in texture should be discarded. They should be laid solid in cement mortar with full joints, leaving no cracks or holes for the passage of sparks.

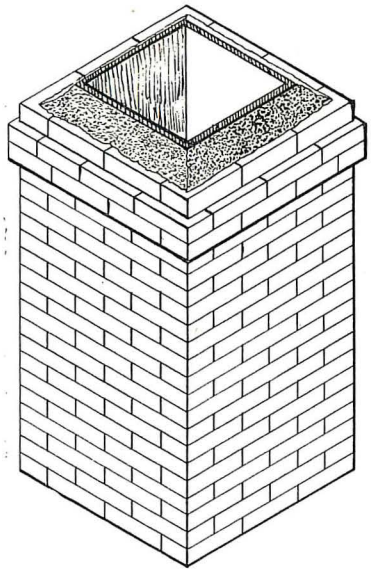


Fig. 5.

The topping out of the chimney (that portion extending above the line of the roof) and also any exposed portion of the chimney, should be laid in Portland cement and lime mortar, in order to prevent disintegration, caused by the effects of the atmosphere and the gases from the smoke.

Fireplaces.

The accompanying drawings and details (Figures 6 and 7) show the construction of an ordinary brick fireplace that is to be furnished with a portable grate. Assuming that the fireplace is to be on the first floor, an ash pit is formed in conjunction with it in the basement, so that the ashes from the grate may be readily discharged into it, and from which they may be removed. A furnace flue is also a combined feature.

The constructive features of a fireplace consist of a clean-out, ash-pit, ash-chute, trimmer-arch, hearth, fire-box, piers, flues from basement, throat, fireplace flue, damper, veneer, and mantlepiece.

The detailed drawings of fireplaces and flues are seldom made by the architect, for it is generally supposed that any good bricklayer can construct them properly. This is not always the case. Smoke is emitted into the room from a fireplace by improper construction

just over the opening of the fire-box, (commonly known as the "throat"), or improper construction of the flue above the throat. The first defect is most common, and is the result of carelessness on the part of the mason, or an elaborate attempt to make a good job without understanding the proper lines and shape of the "throat."

Sometimes the back lining of the firebox, or in other words, the "throw," is brought forward to form a long, narrow throat about two or three inches wide. It is best to have the throat not less than four and one-half inches wide, with the length equal to the width of the fire-box at the back. Providing no adjustable head, throat and damper is used, the width of the throat should begin to enlarge, two courses above the end of the throw. At the same time the length of the throat should be narrowed until the proper size and shape of the flue is obtained. I advise, however, the use of an adjustable head, throat and damper as is marketed by The Colonial Fireplace Co., of Chicago, Ill. Dampers are used chiefly to overcome atmospheric changes and to regulate the quantity of fuel used.

Aside from the improper construction of the throat, the smoky fireplaces are due to the fact that flues of proper size have not been provided. A good proportion for the flue of a fireplace in which it is intended to burn wood or soft coal, is to make the sectional area of the flue 1/10 that of the opening of the fire-box, providing the flue is to be square or rectangular, and 1/12 if the flue is to be circular in section. Where hard coal is to be used the flue area may be made 1/15 that of the

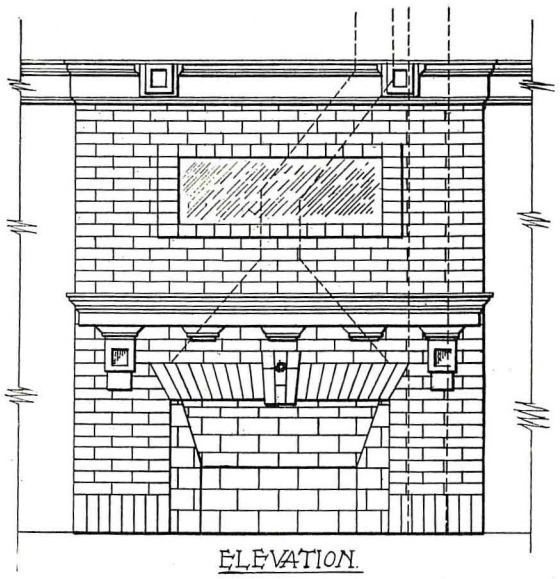


Fig. 6.

opening for square or rectangular flues and 1/18 for circular flues. For general purposes, however, it is best to make the sectional area 1/12 for square and rectangular and 1/15 for circular flues.

Generally, the rough fireplace is constructed along with the main construction of the house. After the house has been plastered and before the finished floor has been laid, the face work or veneer of the fireplace is the next operation. In case the brick are to run straight across the opening, or a jack arch is made to span the opening, at least one iron bar is used as a support for the masonry above it, and a sufficiently heavy bar should be used to withstand the weight of the masonry.

After the finished floor is laid, the hearth should be placed. The hearth should have a sub-foundation of 1:2:4 mixture of concrete at least two inches deep. The foundations for hearths should be placed upon a brick arch, if possible, in which case the concrete foundation need be only two or three inches thick. If, however, an arch is not used for the support of the hearth, the amount of concrete in the sub-foundation should not be less than six inches thick, and this should be supported by two inch planks.

Lay out a full sized diagram of the hearth on paper, and cut out the floor to fit the diagram, allowing one-fourth of an inch for spreading. Put all the tiles

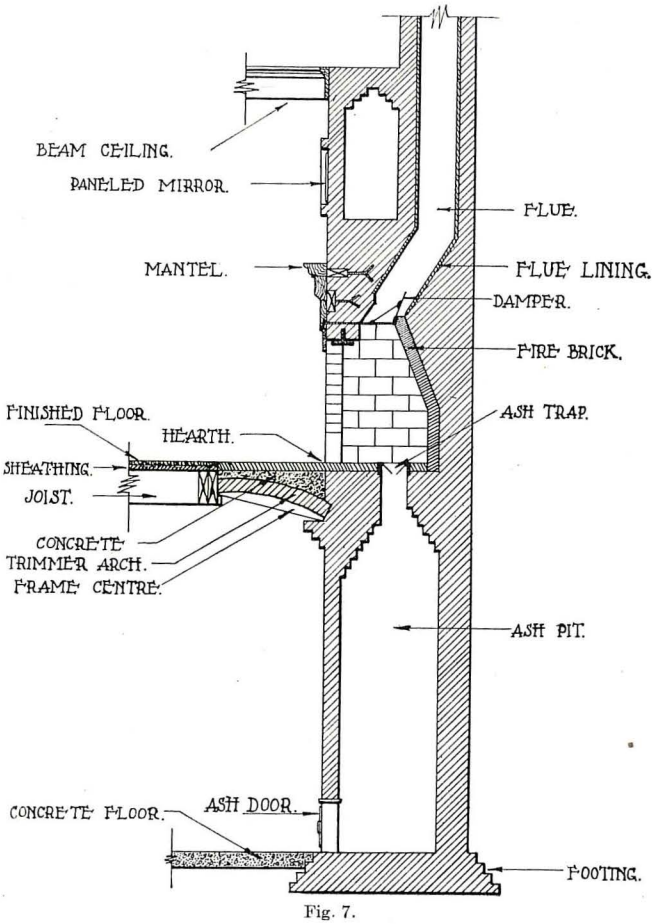


Fig. 7.

Lunch Room Form 5.—Print Shop: *Ye Highe Schoole*

WEEKLY STOCK RECORD

Flour

DATE	AMOUNT	PRICE	DATE	BALANCE
Oct. 5	50 sack	$1.25	Nov. 25	44 sacks
Dec. 4	42 "	"	Dec. 11	41 "
18	39 "	"	Jan. 4	36 "
Jan. 15	34 "	"	22	32 "
29	29 "	"	Feb. 12	25 "
Feb. 19	24 "	"	26	23 "
Mar. 12	22 "	"	Mar. 19	31 "
26	20 "	"	April 1	19 "

7. Stock Inventory Card.

The products used as examples for these lessons included among other things: Devil's food and white cake, loganberry pie, rye, white and graham bread and hot cross buns, baking powder biscuits, nut bread, apple dumplings, Boston brown bread, doughnuts, German rocks, peanut cookies, sponge cake, and chops.

It can be seen easily that there was no repetition in the articles prepared, that nothing was sacrificed for the sake of the market and that in some cases it allowed an even wider choice of examples than would have been possible otherwise.

The undertaking would have been valuable even if it had gone no further than this correlation of the domestic science department with the lunchroom. However, it did not seem that the value of things to be gained from correlation should stop with the manufacture, when it was entirely feasible to carry the idea a step further and include the business side. From the outset then the commercial department was called on to help organize the business of buying and selling and devising a method of accounting that would keep an accurate account of the business of the lunchroom.

This was especially to be desired since several skeptics had declared that they never had seen a lunchroom or cafeteria operated for the benefit of a school or club whose receipts had not run behind its expenditures. In developing the basic principles we were fortunate enough to have the expert advice of Miss Cornelia Giddings of the Pittsburgh schools, who had formulated methods and accounting forms thru actual experience in several of the leading high schools in Saint Louis. These methods and forms with only a few minor changes we adopted.

Lunch Room Form 6.—Print Shop: *Ye Highe Schoole*

Page 1

Daily Supplies Used

DATE	ARTICLE	AMOUNT	PRICE	TOTAL
April 28	Beans	30#	.06	$1.80
	Bread	12 loaves	.15	1.80
	"	4 "	.10	.40
	Roll	12 doz.	.10	1.20
	Potatoes	1 pk.	.80 bu.	.20
	Apples	1 pk.	1.75 "	.44
	Logan berries	15 #	.22½ #	3.37
	Baking powder	1 #	.40	.20
	Sugar	15#	.05	.75
	Cornstarch	2pkg	.05½	.11
			Total	$10.37

8. Daily Supplies Record. Original 5 in. x 8 in.

The most important one of all is the serving of nothing but five-cent orders. There are two excellent reasons for this plan. The first of them is that it allows for more nearly balanced rations, having real food value, and the second is that it permits costs and percentages to be figured accurately. There is of course no limit to the number of orders an individual may buy, but if he selects three things from the daily variety of eight or ten things offered, he is sure to have sufficient food value or heat calories to keep him in physical trim. With an enrollment of 1,200 odd pupils, we serve an average of 1,000 orders daily, $50. This would run about one order to the enrolled pupil. What really happens tho is that about one-half of them buy two orders, the others carrying their own lunches or going home to eat.

Lunch Room Form 3.—Print Shop: *Ye Highe Schoole*

Daily Counter Sheet

HIGH SCHOOL CAFE Date *May 3, 1915*

MENU	PREPARED	LEFT OVER	SOLD	CHECKS	HELP
Soup	112	1	111		30 @ 10¢
Meat	400	63	337		
Vegetable					
Potatoes					
Cocoa	150	47	103		
Tea	6	5	1		
Milk	40	6	34		
Rolls					
Sweet Rolls					
Salad	90		90		
Fruit	69		69		
Stewed Fruit					
Desserts	200	74	126		
Ice Cream					
Sandwich	160	7	153		
TOTALS	1227	203	1024		

9. Daily Counter Record of Sales. Original 8 in. x 8 in.

Another important principle that was kept in mind was that of the percentages of sales to be allowed for raw materials and gas, labor, administration and depreciation charge and profit. Since we did not desire to make more than a small profit, to be on the safe side and to gradually reduce the cost of the original equipment, the other items mentioned were the leading ones. We decided that for each five-cent order the raw material would cost on an average of 50 per cent and in no case should it be allowed to run over 60 per cent of the selling price. This would have been somewhat difficult of calculation had we not before opening at all purchased a large part of the staple supplies needed for the year. In the purchase of staples in this manner we were able to deal directly with the wholesalers and to figure out the cost of each order before laying in the necessary stock. In this connection we have found the local wholesalers not only willing but eager to assist us in every way.

Lunch Room Form 10.—Print Shop: *Ye Hyghe Schoole*

Lunch Room Summary Sheet Feb 8 to March 4 1915 (15 school days)

	EXPENDITURES																				RECEIPTS					
		Pay Roll	Sundries	Dairy Supplies	Fish	Raw Materials	Phi Chi Club	Rotary Club	Vegetables	H. Y. Club	Meats	Fruits	Principal's Club Chemistry Supplies Faculty Dinner	Ice Cream	Gas	Ice	Administrative Expense	General Expenditures for 2 mos.	Total Expense		Checks Received	Sales Spreads	Sales Material	Total Receipts	Profit	Check Sales
February 8		15 65	1 70	5 40	4 35	6 66			4 47		1 00	10		1 50	1 12	28	7 09	28	55 60		62 30			62 30	6 70	79 15
9		15 65	1 70	2 48		6 24			2 65		10 70	2 37			1 12	28	7 10	28	50 57		57 75			57 75	7 18	49 70
10		15 65	1 70	5 67		5 13			1 70		7 31	2 56			1 12	28	7 10	28	48 50		54 75			54 75	6 25	43 20
11		15 65	1 70	6 67		8 18			3 38		7 40	4 20			1 12	28	7 10	28	55 36		57 10			57 10	1 74	49 30

10. Summary Sheet. Original 15 in. x 10 in.

Not alone has this been true of the wholesale grocers, but of the commission men as well. The most expensive item that we serve daily has been the meat and potatoes and the fact that we have been able to serve it at all at five cents may be due to our policy of using largely one cut of beef and preparing it in various ways. By buying large quantities of this cut we have found it possible to buy at several cents a pound below the retail market from the firm that supplies most of the leading hotels and restaurants in the city.

This care in buying we have supplemented by equal care in preparation. Under the general supervision of the head of the domestic science department there is a very capable practical cook in charge of the kitchen with five women assistants to look after various phases of the work. These women have required much training, but they early reached a stage of high proficiency, and there has been little change in their personnel since we opened. No other kind, we have found, can have everything ready in an attractive form day after day. Their wages run from a dollar and a half to two dollars and a quarter a day. With the addition of the porter for the harder physical work the payroll runs 25 per cent of the income.

Gas for cooking runs between one and two per cent for each order and the administration and depreciation charge from thirteen to fourteen per cent. Under this latter is included one-half of the salary of the domestic science head, one-quarter of that of the vocational education head, and a ten per cent annual depreciation charge on an investment of $2,500. These various costs have left a net profit for the year of 4½ per cent on a business of $1,000 a school month. Our raw material and gas costs for the first six months were 57.5 per cent; payroll, 25 per cent; and administration and depreciation, thirteen per cent.

Aluminum checks, good for five cents each in the lunchroom at any time, may be purchased of the cashier at the entrance. Students act as dishers and receive ten cents in food for serving one period or twenty for both periods. Ten of these waiters have no trouble in serving from 250 to 300 customers in ten or eleven minutes, so that the last person served has twenty minutes in which to eat before his next class is called.

The 3 by 5 cards that are used to keep track of the supplies in the domestic science kitchen are five in number. The first is for supplies that are kept in the domestic science storeroom for general preparation and used for occasional demand. The next card is one showing supplies furnished to the domestic science kitchen from the lunchroom storeroom. The third shows materials which are used by the girls in the preparation of lunchroom products. The fourth card is a record of those products and the quantity prepared for the lunchroom, and the final card shows material used for the classes themselves.

The accounting forms in use for the supplies consist of a Purchase Card for each article used, to which is posted the items direct from the invoices after the amounts have been verified; a Weekly Inventory Card showing the amount on hand; and a Daily Supplies Used sheet, giving the various articles, amounts, prices and total cost. The daily costs are posted to a summary sheet for the month and the bills that come in monthly, like gas, are apportioned among the number of school days in that school month.

The accounting for the selling end begins with a Daily Counter Sheet. The first column of this shows the number of orders prepared of each kind, the second column the number of left-overs and the third the number sold. Each disher must have either a left-over or a check in his box at the close of his sales for each order prepared. Later these sales are posted to another monthly record sheet showing sales of various commodities and are totalled at the end of the school month.

All the necessary record work for keeping the system up to date is done by advanced pupils from the bookkeeping classes during their regular class time and credit is given for it.

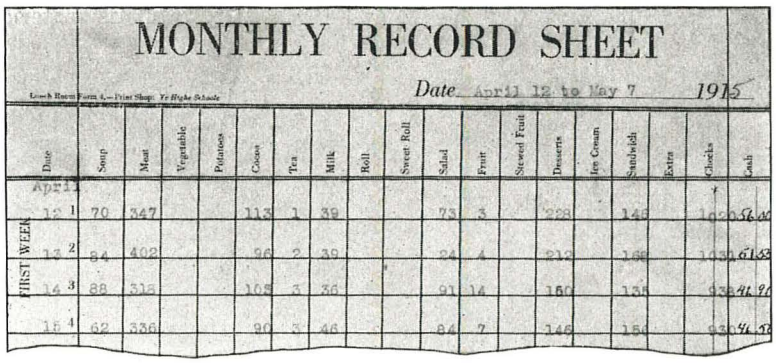
For many reasons it was found advisable for the lunch accounts to be run as a separate business rather than have the bills go thru the regular channels of the Board.

A checking account is maintained under the name of the High-School Lunch Room and bills for supplies are paid upon the "O. K." of the head of the domestic science department by the head of vocational education, who acts as business manager of the lunchroom. In order that the Board of Education may have accurate knowledge of the conduct of the business a monthly report showing all phases of the buying and selling, including a financial statement with vouchers, is submitted. Without such a statement, capable of being audited, probably no board would care to become responsible for the contraction of bills.

It seems to me that the scheme outlined above has several points worth the notice of schools looking for the greatest efficiency in their lunchrooms. It brings together three distinct phases of the modern high school,

helping the plant to run more smoothly, and it gives the pupil more and better food for a price below the usual cost. The high-school lunch should be nourishing and it should be cheap. Many schools have solved the former, but few the latter, of these two things. Because many things are sold at odd cents does not very often mean that they fit the need of a lessened cost. High school life grows in expense each year for the pupil. These needs must react on the number who find it possible to continue their educations. Our average lunch costs from ten to twelve cents. The ideal high school lunch would be a balanced ration at a cost of five cents—we haven't reached it yet.

In conclusion, let me say that this plan has been in operation since October 5, 1914, and is working every school day in our town. As Herbert Kauffman has intimated many times, those who say a thing is impossible are apt to be interrupted by its execution.



MONTHLY RECORD SHEET

Lunch Room Form 4.—Print Shop, Ye Hyghe Schoole

Date April 12 to May 7 1915

	Date	Soup	Meat	Vegetable	Potatoes	Cocoa	Tea	Milk	Roll	Sweet Roll	Salad	Fruit	Stewed Fruit	Desserts	Ice Cream	Sandwich	Extra	Checks	Cash
FIRST WEEK	April 12 1	70	347			113	1	39			73	3		228		146		1000	56.00
	13 2	84	402			96	2	39			24	4		212		166		1430	61.53
	14 3	88	318			105	3	36			91	14		160		138		930	41.90
	15 4	62	336			90	3	46			84	7		146		150		930	54.38

11. Monthly Record of Sales. Original 8 in. x 8 in. Space is provided for four school weeks. The figures are the totals from the Daily Counter Sheet (Form 9).

ESSENTIALS OF DESIGN IN TYPOGRAPHY

Fred Victor Cann, Dunwoody Institute, Minneapolis, Minn.

(Fourth Article)

AN understanding of at least the general principles of design will be of inestimable value to the apprentice and will not only aid him to lay out his work, but will help solve many perplexing problems as they may arise from day to day.

The essence of the ability to design is invention, and the apprentice if he would be a good designer needs to exercise his inventive faculties. While it may not be necessary to be an expert designer to be a good printer, yet the two arts are closely allied and much time and expense may be saved by what may be called pencil printing or layout work.

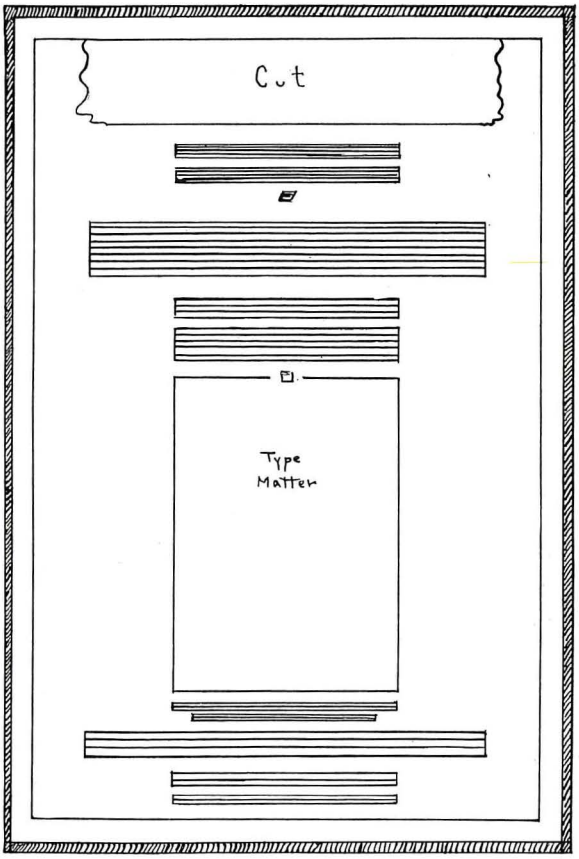


Plate 1.

It may readily be seen that to the beginner, at least, the time taken in setting type to carry out a half formulated idea, might be better employed making quick, rough sketches until a satisfactory arrangement has been arrived at.

The best of the sketches could then be set in type thus saving much valuable time and producing more variety of ideas to select from.

The art of printing requires a general knowledge of the principles of good design. Consciously or unconsciously the printer is to some extent at least, a designer. He works with type and plates, spaces of black and white, and color. To know a good thing when one sees it, is not enough if one would be an expert in his chosen work.

The printer today, needs to know how to produce fine work, by any or all of the modern processes. While it is impossible under modern conditions, for one man to be an expert in all branches of the printing art, he can at least have a good, general knowledge of the different processes; and, if he wants to learn any one branch of the business, he needs to specialize as early as possible.

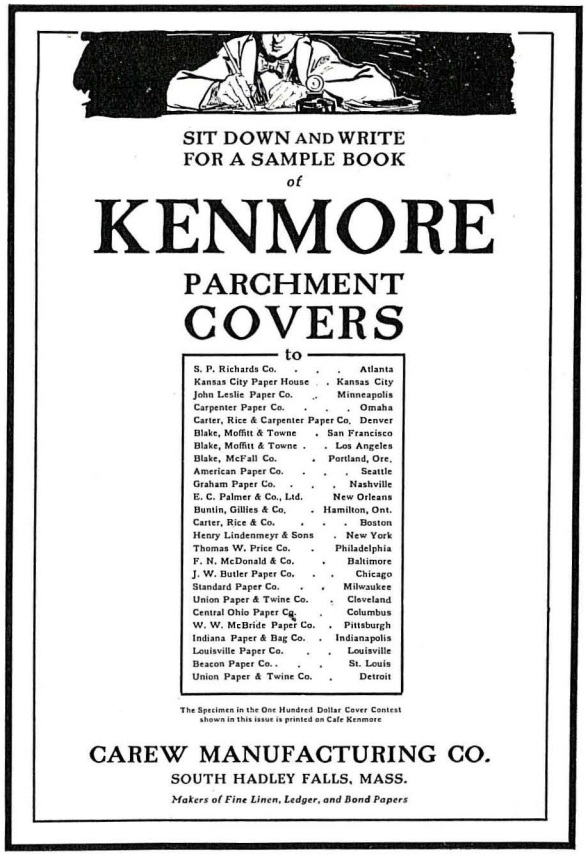


Plate 2.

The artist should know the limitations of the printer, that he may co-operate with him in getting the best effects possible from originals. The printer needs to know at least the principles of design and color as related to his art. In this way, not only a better feeling of co-operation may exist between the two, but much better results will obtain. Higher class, more artistic, more effective printing will be ours.

The method of procedure in an ordinary job of printing is, briefly, as follows: Usually the copy in manuscript form is given the printer. He may make up a rough layout or dummy and have it "O. K.'d" by the customer. It is then turned over to the compositor, who sets the job; he then locks it up and it is made ready for the press, run, folded, collated, and bound. Part of the work of the designer is to help the printer to save time

and money by making layouts that give exact sizes of pages, margins, drawings, etc.

Design from the standpoint of a printer resolves itself into two distinct phases or classes: Freehand and geometric or mechanical. The ability to sketch readily freehand, to lay out rough diagrams to show how the job is to be carried out, is about as far as we may go.

It must be remembered that decorative design should be kept in flat values so far as possible and pictorial and decorative work should not be confused.

The layout for the printer takes the place of the working drawing of the mechanic. It is simply a means to an end. The apprentice should know how to read layouts and be able to carry out any ideas suggested therein.

To make a finished drawing for reproduction is the work of the professional designer or artist, and should

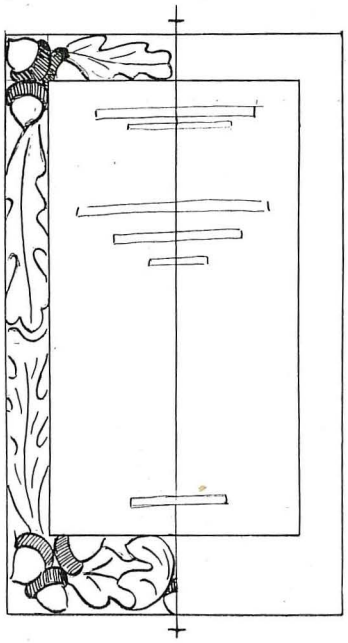


Plate 3.

not be attempted by the amateur, at least until he has progressed beyond the amateur stage.

Spacing.

It is very important that the apprentice study good spacing. Next to a wise selection of type this is the most important part of composition, and very hard to teach to the beginner. In hand lettered work spacing is even more important, as the best piece of work as far as drawing is concerned, can be ruined by poor spacing.

Type is made in condensed, expanded, and regular or common widths to meet this demand of spacing. These various widths of type answer the purpose very well for straight commercial work.

Often the printer is called on to make a special label to fit a given space—something unusual in an advertisement or cover design. If he cannot draw himself he is compelled to resort to the layout man or designer who makes a rough sketch or suggestion, submits it to the printer and customer. If the sketch is "O. K.'d," the finished working drawing is then made and the plate engraved.

A few examples of good type spacing are shown in plates 2, 3, 4, 5. The rough sketches, Plates 1 and 3, show the method of laying out an ordinary job. The student would do well to study these specimens carefully. A good assortment of samples of printing should be made and kept on file for ready reference.

Relationship of Parts.

The designer or artist is governed to a certain extent by the shape of the space he is to decorate. To fit a square into a circle is not always good design.

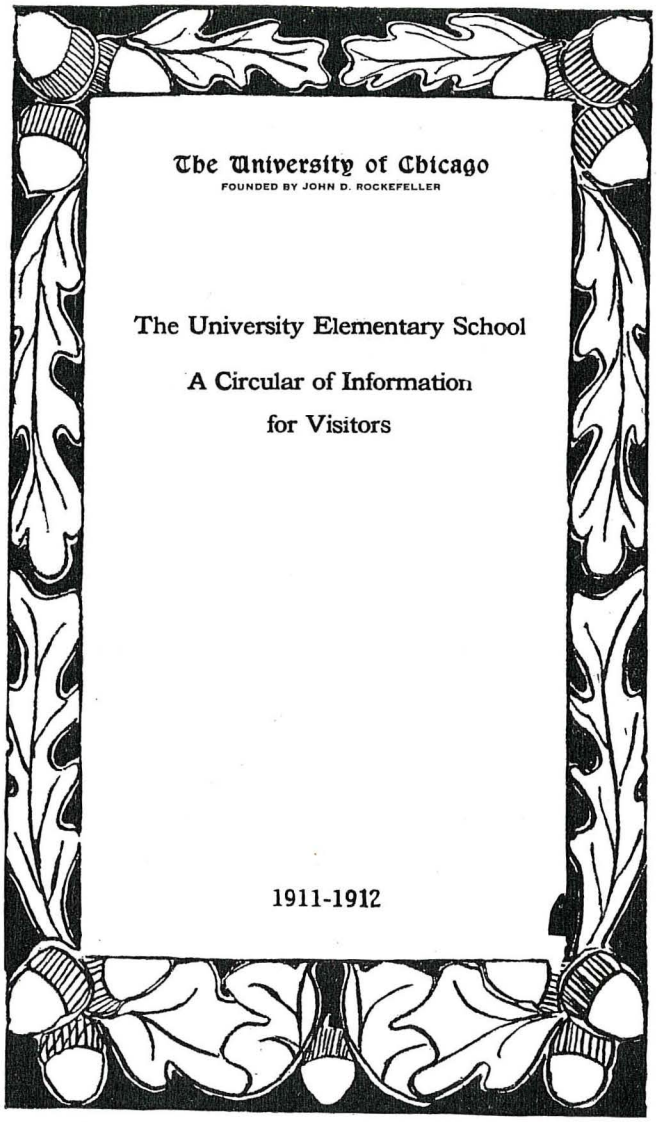


Plate 4.

Let us suppose the shape to be decorated is rectangular; the natural thing to do is to make the design rectangular, as illustrated in Plate 6.

A page needs a border; the shape is rectangular; the text suggests the design. It is the office of the artist to accent, if possible, the printed page. If he makes the border too strong in color, heavy in line, or too attractive, so that the eye sees only the design and passes over the type, he is defeating his own object. The text (reading matter) is the thing, and should not be subordinated to the design. In Plate 7 the border is too in-

sistent; the text is the last thing one would look at in this case. The page shown in Plate 8 is a much more successful piece of work; the border does not dominate the page, but rather accents the type—throws it out into relief—makes it more effective. In the latter example the relationship of parts is more successfully carried out.

The student would do well to study examples of printing like the examples shown in these pages. Modern design takes into account the fact that a design, to be good, should be appropriate in style and color, and that the parts should, to a certain extent, at least, be related to one another. Shape must fit shape, and each part interlock, assemble or weave into a complete and attractive whole.

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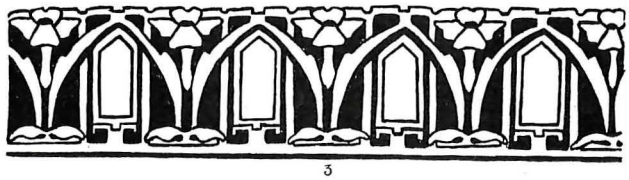
Plate 5.

Proportion.

Proportion, used in the sense of typographic proportion is a hard thing to analyze, define, or make rules for. The architect makes a scale drawing of a building, and is limited by the size of the paper he works on. It would be out of the question to make a drawing of a building actual size. The engraver usually gets a drawing made on a large scale to reduce to fit a given space or page. He works in just the opposite way from the architect or machinist, who works from a small drawing and enlarges to a larger scale. The photographer can either reduce or enlarge a drawing in the camera, as the case may require. It is simply a mechanical process that requires accuracy and good judgment.

Proportion from the standpoint of a designer or artist, means much more. He needs to think in good



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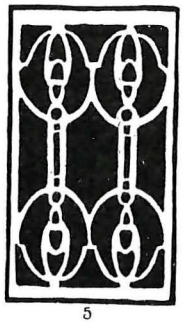

5

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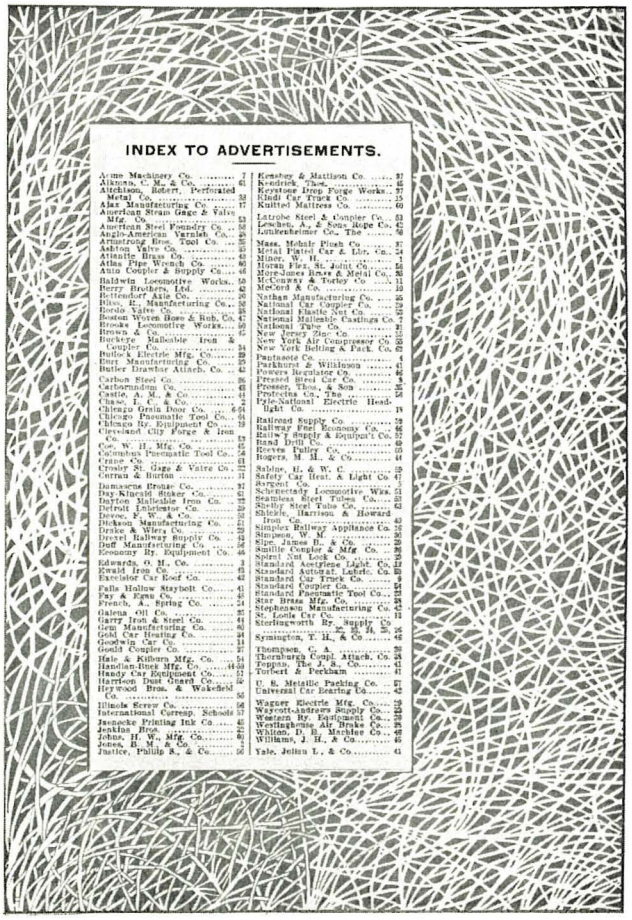
Plate 6.

proportion to express himself in good proportion—a much more difficult thing to do. The printer is influenced to a certain extent, by the sizes of stock papers, and ready made types of standard sizes and styles. He sets the type to measure, chooses a suitable size of paper, that will cut to good advantage, allowing for margins, trimming, and binding. It is the work of the artist to decide the proportion and size the paper is to be in the first place, design the type to size, choose the color the



INDEX TO ADVERTISEMENTS.

Plate 7.

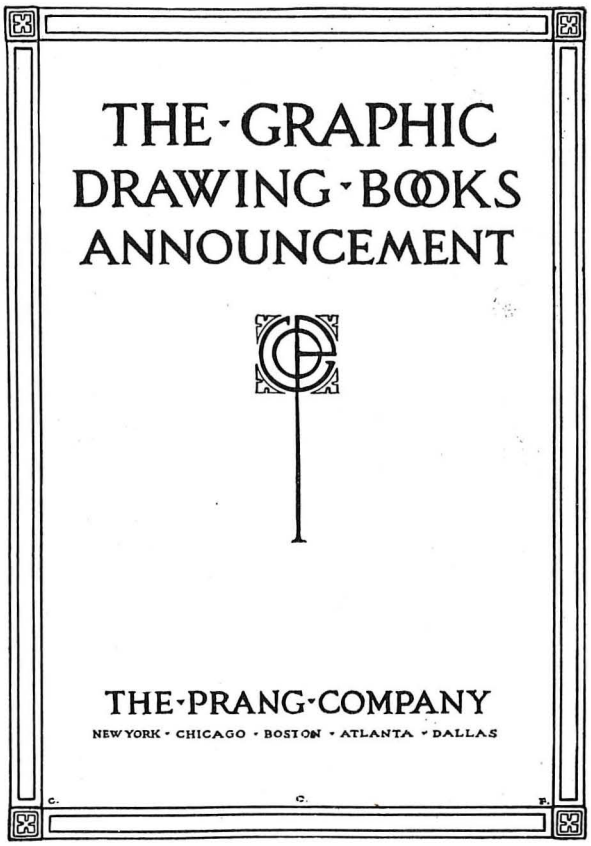


Plate 8.

paper is to be tinted or dyed while in the making. Originality, invention, good taste, are required of the designer.

Proportion is largely a matter of eye training. We know instinctively when a thing is out of proportion. A simple method of testing for proportion is suggested in Plate 9.

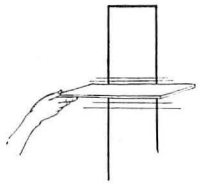


Plate 9.

Draw an elongated rectangle on paper or blackboard, and move a sheet of paper large enough to cover part of the rectangle up and down on the figure until a rectangle of good proportion is decided on. Most people will agree on the proportion of such a figure. This suggests that the human eye is not satisfied with poor proportion. A too freakish thing is offensive. A design to be good must be well thought out, pleasing to the eye, appropriate in style, effective, in good proportion. A few examples of designs, well placed and in good proportion, are shown in the accompanying illustrations. Plates 4, 5, 6, 9.

Variety.

Variety is essential in decorative design of any kind, especially of typographical design. Monotony is tiresome in design as in any other work. The artist tries to avoid monotony by variation. Of course, it is often necessary to repeat units to cover surfaces, to make borders, etc., but this need not be monotonous if well carried out. Variety may be achieved in many ways.

The accompanying illustrations show a number of examples of both variety and monotony in design. The student would do well to study any designs he may see for variety's sake; in this way his observation may become more acute and he will learn what is meant by variety in design.

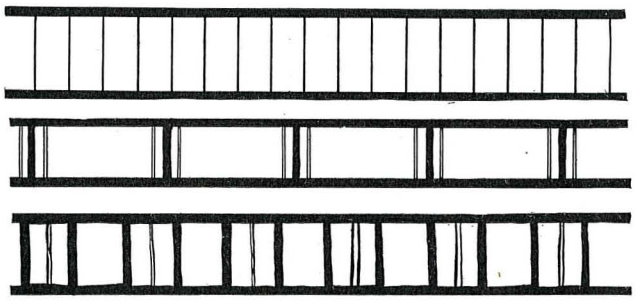


Plate 10.

In Plate 10 variation is shown by changing the width of the spacing and alternating wide and narrow lines. Number one is monotonous; the lines and spaces are of uniform width. Number two shows wide and narrow spacing thus giving more variety. In number three the monotony is broken by introducing narrow lines with the wide ones.

Credit is due The Keramic Studio, The Prang Co., American Type Founders' Co., for examples kindly loaned and assistance given in compiling the preceding pages.

If teaching was what teaching seems
And not the teaching of our dreams
But only putty, brass and paint,
How quick we'd drop her, but she ain't.
—*Rudyard Kipling.*

CHAIR CANING AS A HOME ART

J. Gilman Rand, Instructor, South End Industrial School, Boston, Mass.

CHAIR caning has always been considered an art dedicated to the work of some sort of institution. The repairer of cane and willow furniture has been able to overcome the obstacles of the work, but few realize that anyone can cane a chair with very little practice, as successfully as the professional worker.

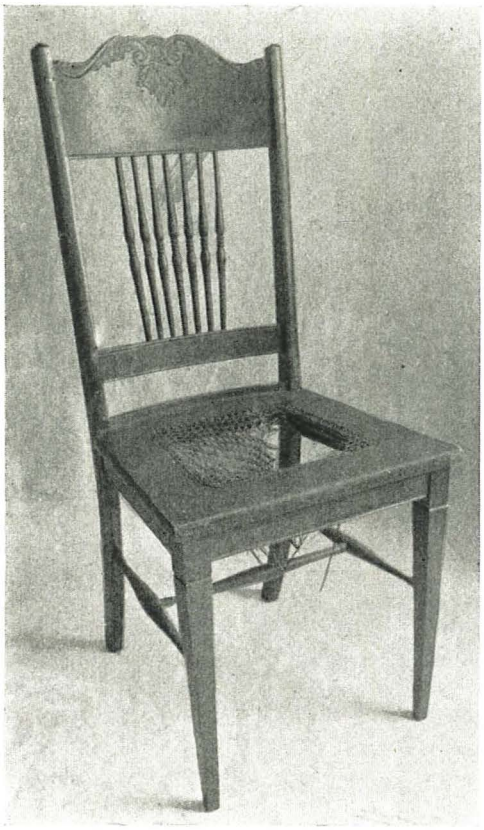


Fig. 1. A Wreck, but easily repaired.

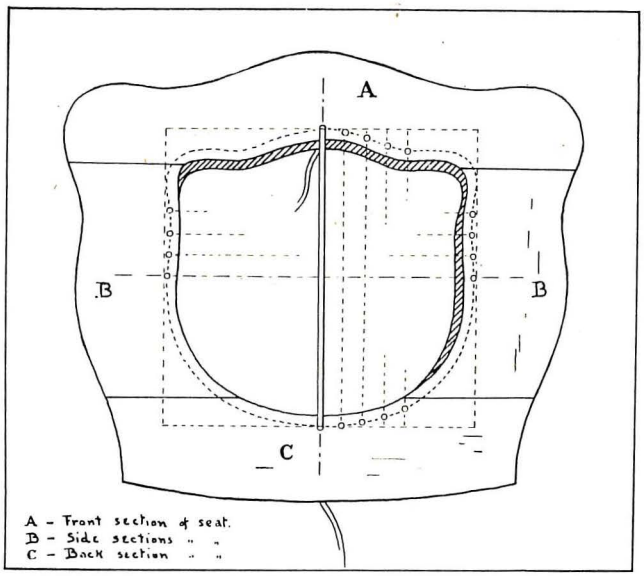
Who has not watched with growing apprehension the breaking away of the caning in the seat of some particularly cozy chair? Or perhaps one of the dining room set threatens thus to dismiss itself from further service; for once the cane has broken away it has always been thought necessary to relegate the chair, plus a wooden seat, to the kitchen, or to call in the services of a professional repairer. Aside from the cost of having such work done, the time consumed in the repairing, and the trouble and expense of getting the chair to and from the repairer is considerable.

Many an odd penny may be earned by the person who possesses the necessary knowledge of this field of labor. Professionals have various ways of reckoning the charges. In some localities the charge is three cents a hole across the front (multiplying the number of holes in the front section of the chair by three to find the cost) the minimum charge being 85c and increasing to $1.25 and $1.50 according to the size of the seat. This may include cleaning and revarnishing but does not include express charges either way. In other localities the cost is about one cent per hole (counting each hole in the seat all the way around) but prices vary with local conditions.

The necessary tools are a scratch awl, two or three common skewers, which may be had at any meat market for the asking, and a pair of wire cutters or scissors for cutting the cane. The cane can be purchased at any large school supply house or at any shop where cane and willow furniture is repaired or built. The present price of cane is about 70c per bunch, each bunch containing about 1,000 feet, or enough material to cane-seat four ordinary chairs. Cane comes in twelve foot lengths and in four widths, fine, medium, course and binding. The medium is best for ordinary use. A length or two of binding cane is sufficient for each chair.

Not all chairs that have the appearance of being cane-seated are bored for the work, as many are seated with cane-webbing stretched on a frame and set into the seat. Such chairs must be bored before any caning can be done. A drill or bit making a hole one-quarter of an inch in diameter is the best size to use for this purpose. Roughly speaking the centers of the holes should be about three-quarters of an inch apart and bored on a line about one-half inch in from the four inside edges of the seat—the closer they are together the finer meshed will be the caning. They must be bored in such a way that a line connecting corresponding holes at the front and the back of the seat would be parallel to a line running from the middle of the front to the middle of the back of the chair seat. The same rule applies to the boring of the two sides. This may cause the distance between the holes to vary slightly in different parts of the seat, especially if the seat be of fancy shape, as in photograph XI, but a careful study of drawing "A" will make this explanation clear.

If the chair is already bored for caning, clean out all the old cane with a scratch awl. With a stiff bristle brush thoroly wash the chair and it is ready for reseating.



A. Method of finding position of holes for boring.

A length of medium cane free from cracks and flaws is selected and soaked in hot water for a few seconds to make it soft and pliable. As the cane dries in the process of working it must be kept pliable with a wet sponge or cloth. *If this rule is not observed the cane will crack and break.* On examination, the right or upper side of the cane is easily distinguished by its smooth and glossy appearance, while the wrong or under side looks rough and woody. As the cane is barbed at intervals of nine to twelve inches the end toward which these barbs face should be the one first attached to the chair. The direction of the barbs can be easily determined by running the thumb nail along the smooth side of the cane.

Amateur workers generally prefer to start the cane at the middle hole in the back, passing it across the

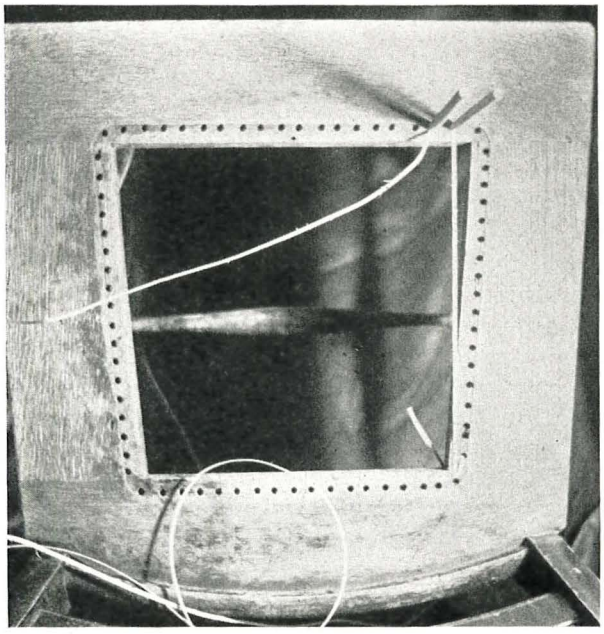
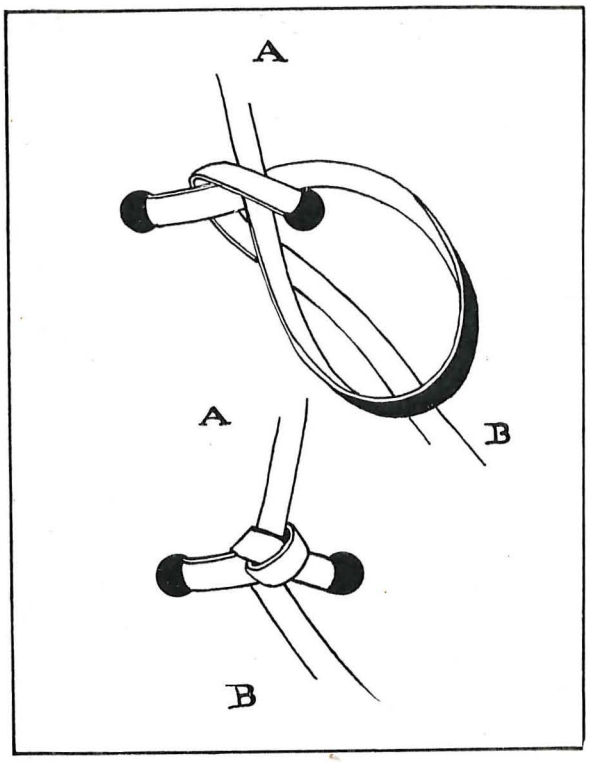


Fig. 2. The chair seat prepared for caning, the first fastening of the cane, the weave begun and the use of pegs.

opening in the seat of the chair and down thru the middle hole in the front; then up thru the next hole to it, again across the opening and down thru the second hole in the back. This continues until the last hole in the back has been used. In some chairs the difference between the number of holes in the back and front sections is so great that one or even two more *parallels* running from the remaining holes in the front to holes on the side will be found necessary. The other side of the seat is laid in in the same way. The more experienced worker prefers to start at one end of the back section and work all the way across as shown in Illustration II.

This avoids an extra piecing of the cane, and of course the fewer piecings there are the neater the work. The chair in the photograph had eighteen holes in the back section and twenty in the front, thus the first hole in the back connects with the second in the front. Had there been seventeen holes in the back and twenty-three in the front, the first hole in the back would have con-



A. End of old Cane. B. End of new Cane. B. Method of tying cane—Seating Knot.

nected with the fourth hole in the front leaving a space on the side to be filled in with extra parallels.

Whether working from side to side or from middle to side, the cane is attached by pushing the end down thru the starting hole, up thru the next, down again thru the starting hole and tucking the end under the loop on the bottom of the chair. The free end is pulled taut, and a skewer is wedged into the hole to keep the cane from slipping. Care should be taken in all stages of the caning to keep the shiny side of the cane uppermost, and on no condition should it be allowed to twist either in the seat or the chair holes. Wherever piecing

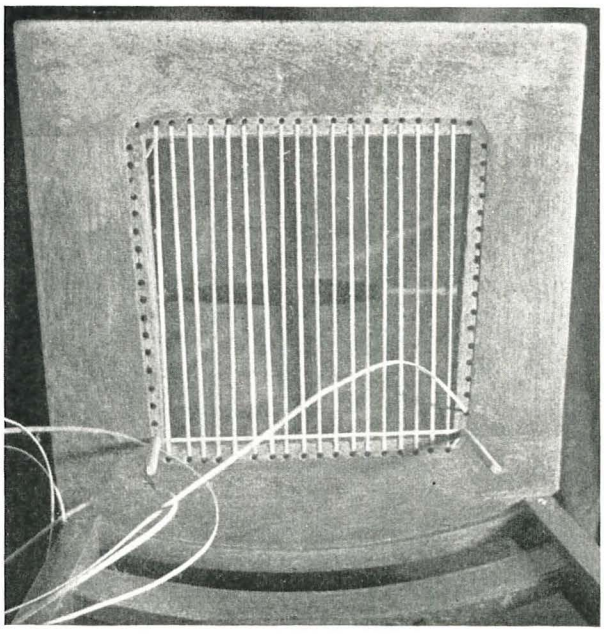


Fig. 3. The first step completed, and the second step in progress.

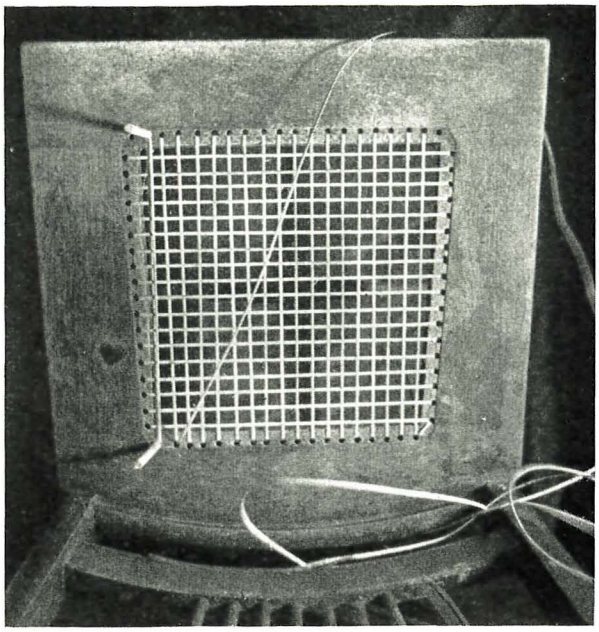


Fig. 4. Completion of the second step, with the third under way.

is necessary insert the end of the new cane in the hole next in order, and join with the end of the old cane on the under side of the chair using the Cane-seater's Knot —drawing "B." As soon as tied the ends are cut off about one-half inch from the knot.

Pull the new cane taut to hold the knot firm, and continue as before. In case a loose end is to be disposed of, pry up a loop on the bottom of the seat with the scratch awl and push the loose end under. The skewers are in constant use thruout the first four stages of the weaving, to keep every inch of the cane so taut that it will sing when plucked with the fingers.

The second step of the work runs over, and at right angles to the first step, and connects one side section of the seat with the opposite—see photographs III and IV.

The third step of the work follows exactly the route

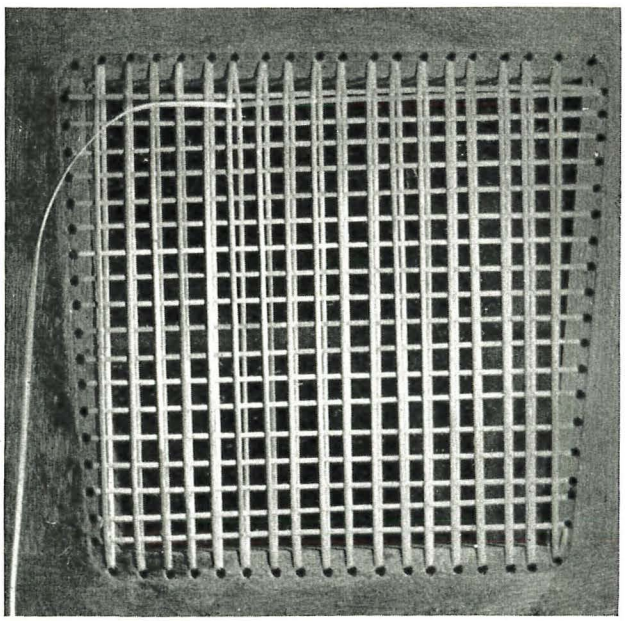


Fig. 5. The third step finished, and the fourth in progress.

of the first, and passes over the second as seen in photograph IV and V.

The fourth step runs thru the same holes as the second and parallel to it, passing over the third and first steps. Thus the cane leaving the first hole in the upper right hand section of the seat passes *under* the first unit of the first stage and *over* the first unit of the third stage, under the first and over the third, etc., taking care always that each unit of the first stage lies each time in the same relative position to its corresponding unit in the third stage. In a similar way each unit of the fourth stage must be woven in on the same side of its corresponding unit in the second stage. The completed fourth step is shown in photograph VI.

The fifth step or the First Diagonal starts at the right front corner of the seat, (as one stands in front of the chair), and takes its course in the general direction

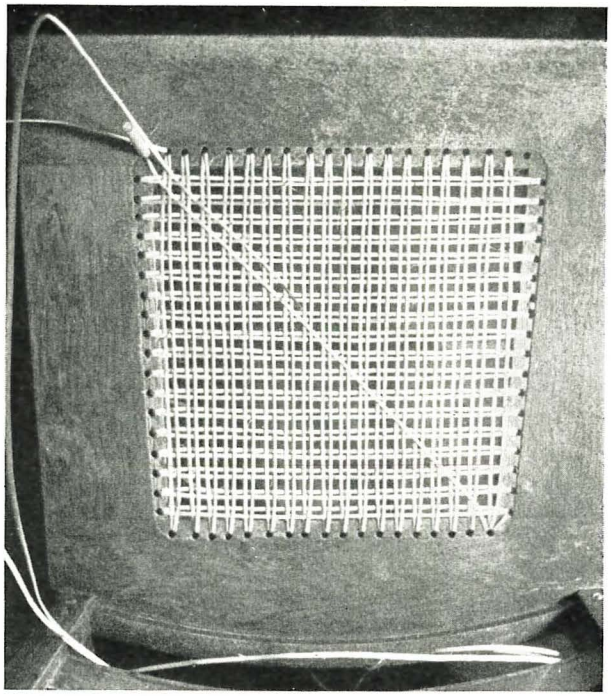


Fig. 6. First of the Diagonal Weaves.

of the corner diagonally opposite, always passing *under* the second and fourth, and *over* the first and third parallels. Study photograph VI. The first diagonal does not always end in the corner hole, but should end in that hole which leaves its course most nearly in a straight line. Continue weaving these diagonals while any holes are left to connect. The completed First Diagonal is seen in photograph VII.

The Second Diagonal plies between the front left and right back sections of the seat, passing *over* the second and fourth and *under* the first and third parallels. Compare with photograph VII. As in the First Diagonal weave continue while any holes are left to connect. For the completed weave see photograph VIII.

The seat is now ready for the seventh or final stage —the *Binding*. This should be commenced at the hole where the cane from the last diagonal would naturally come up. Select a perfect piece of Binding long enough

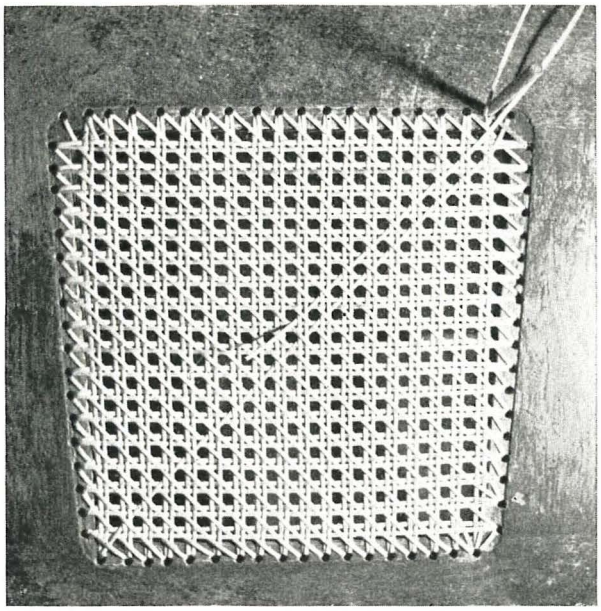


Fig. 7. The Second Diagonal Weave.

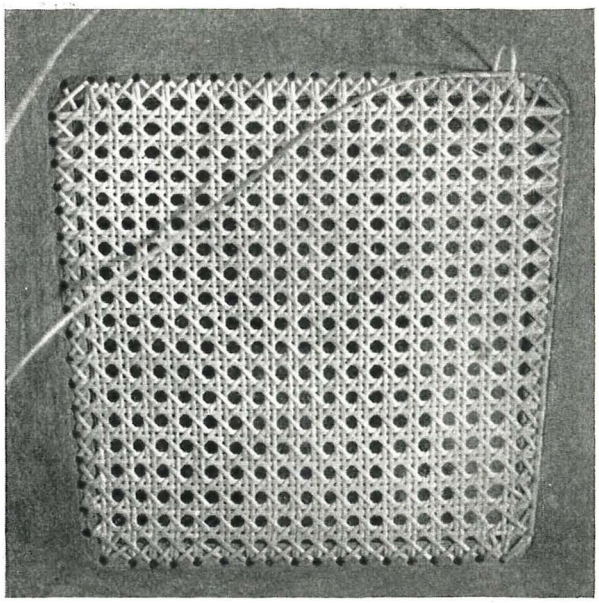


Fig. 8. The Weaving completed, and the method of binding.

to go around the chair seat and lay the end over the hole bringing the weaving cane up thru the hole on the inside, across, and down thru the same hole on the outside of the binding. The weaving cane is brought up thru the next hole in succession and the process repeated. Thus the binding continues around the seat. During this process the awl is in constant use, as the cane already in the holes must be carefully pushed aside to allow for the passage of the weaving cane. Leave no loose loops as the cane must be pulled taut to hold the binding firmly in place. Whenever it is necessary to turn the binding in a new direction, either in a curve or at right angles, both canes must be thoroly wet, then holding the binding down flat to the chair with the fingers of one hand, manipulate into the proper direction and hold flat with the weaving cane.

When the chair has been bound all the way around and the last hole is reached, cut off the binding about an inch beyond the finishing point, and push the end thru the first two loops beneath the first inch of the binding. Fasten off the end of the weaving cane as before directed.

It is unwise for the average person to tamper much with the original finish of the chair. If, however, the varnish has become so worn that there is scarcely any left, go lightly over the whole chair with the finest sandpaper, taking off the shine of whatever varnish remains. Then apply a fresh coat of furniture varnish to the whole

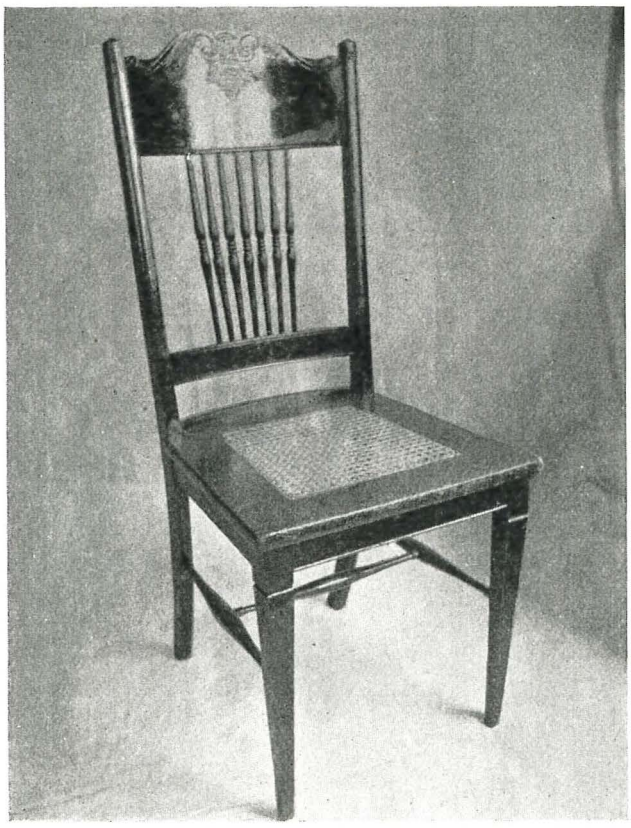


Fig. 9. The Wreck reclaimed and refreshened with a coat of varnish.

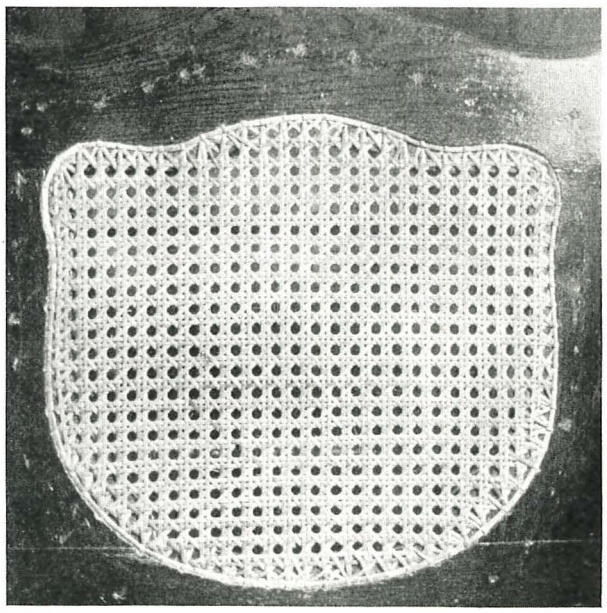


Fig. 11. The Seat caned after being bored. Note scars where the upholstery was tacked on.

Fig. 10. "On the Dangerous List."—This chair was upholstered in cheap velour, and has never been bored for caning.

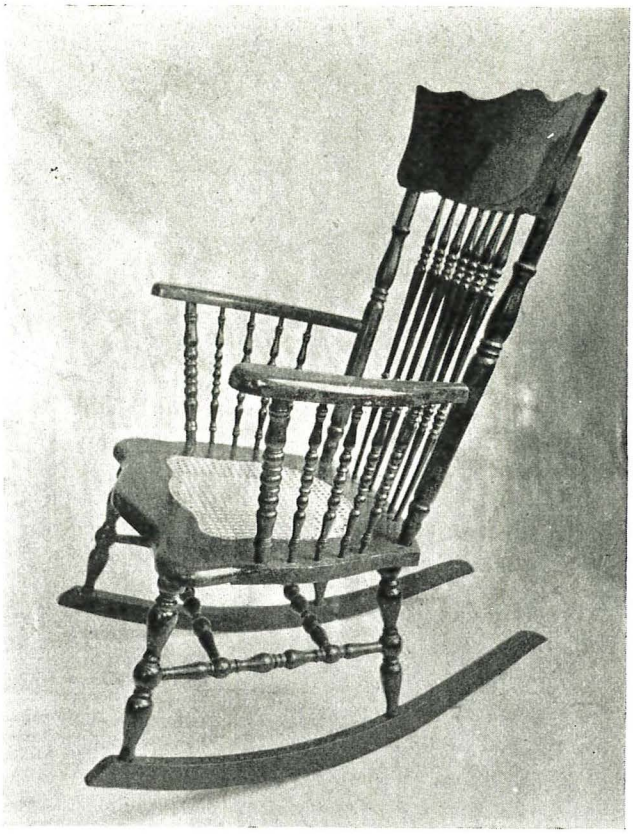


Fig. 12. "Discharged"—Better than new, comfortable and sanitary.

chair, including the new cane seat—with the result seen in photographs IX and XII.

In the case of a chair such as is shown in photograph X, the tacks used in the upholstery leave such large holes in the wood that some sort of wood-filler should be used before varnishing. There are several ready prepared wood-fillers good for this purpose, or a thick paste of glue and fine sawdust answers the purpose admirably. Fill the tack holes with this mixture, and allow it to dry thoroly before scraping down. If the filler shows white as in photograph XI, color the filler to match the chair before varnishing.

Cane seating and refinishing is a trade by which many earn their living, but even the beginner, for the time spent, can turn out an excellent piece of work.

Chair caning as an industry, because of its real educational possibilities, is meeting with growing favor among those industrial educators whose work lies with the backward, delinquent, and physically imperfect youth of our great cities. In a large degree is this true of social settlement centers where the aim should be to provide an occupation easy to master, lucrative, and making directly for home improvement.

ART, as a manifestation of the artistic spirit, has its origin, or, to speak more correctly perhaps, its opportunity in craft, and craft in the needs of life. And as the needs of life vary from generation to generation, and from age to age, so must vary the objects of craft, and with them the modes of manifestation of the artistic spirit.

—*T. J. Cobden-Sanderson.*

Teaching Composition Thru Paper Cutting

Mary G. McMunigle, Supervisor of Art, Pittsburgh, Pa.

THE power to make a good selection and arrangement is the basis of all good art, whether it is the making of a picture, the designing of a costume or the arranging of a room. The keynote is always *good composition.*

In helping our pupils to acquire this power, paper cutting offers us a wealth of material. The child has the interesting problem of moving the parts about until he secures good arrangement. He has also the added advantage of choosing his colors, and trying many combinations, before selecting the best.

In preparing these articles, the intention is not to present new exercises in paper cutting, but to gather together in a logical way the things we are probably all doing and to produce artistic results.

With composition, as with other things, the child should learn one step at a time and be required to apply it in arranging all his other work. It should be taught as conscientiously in the first grade as in the eighth, but in any grade technical terms should be avoided.

Since we understand composition to be an arrangement within a space, it is necessary from the beginning to have a definite space or enclosure. As suggested by Plate 1, we would do well to have at least three paper margins—a square, a narrow oblong and a wide oblong, preferably of cardboard, that they may be handled by the children. The spray of willow may then be fitted into the different margins until they decide on the one into which it fits most comfortably, with not too much space left over. When the children leave the first grade they should be able to recognize the fitness of an object to its enclosing space.

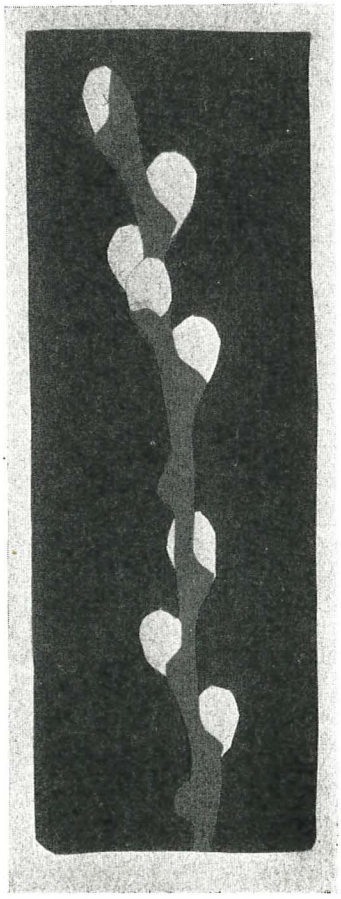


Plate 1. Grade I. Consistent Shapes.

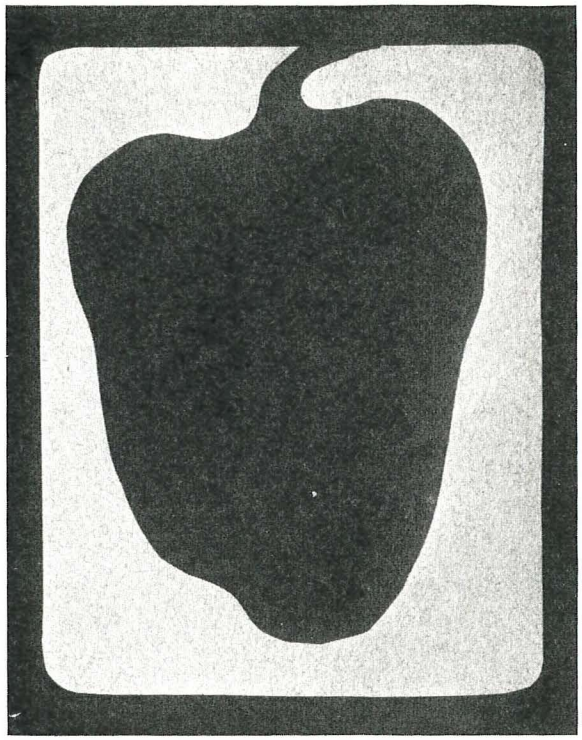


Plate 2. Grade II. Proportion of Object to Background.

From all the illustrations given, it is suggested that the teacher make large movable cardboard models, which may be easily adapted to many arrangements by the children, while visible from all parts of the room.

In Grade II, the next step should be to realize good proportion of an object to the background. The object must always be made more important than the background. In order to avoid the common tendency of children to make objects so small that they are lost in space, it is a good plan to have them cut the margin from a sheet suitable to the shape of the object to be cut and from the paper left, cut the object as large as it can possibly be made. This insures a fairly good size for the space, and children begin to realize there is such a thing as proportion and space relationship.

In Grade III, Plate 3, we advance a step farther in marginal spacing. We learn that in a vertical oblong, the margin should be widest at the bottom and next widest at the top.

Here it is necessary to know something of the relative proportions of two or more objects used together in a composition. We learn that they are much better when there is some variety in shape and size, and yet

Plate 3. Grade III. Proportion of two or more objects to each other and to the Background.

they should always "belong" together. Still life may be used to demonstrate, but as animals always awaken more interest in children of this age, the problem of the movable cardboard bunnies gives us an opportunity. We can show variety in grouping different poses—proportion to each other and the house in which they live. Always remember to comfortably fill the space.

In Grade IV, pupils are capable of appreciating a definite arrangement of background spaces. The movable landscape in Plate 4 is a good vehicle. The teacher should have a large reproduction in cardboard of the forms used. Attach trees to background *at top* with paper clips, so that they may be easily arranged by pupils in full view of the class. The horizon line attached in same way *at sides,* may be easily raised or lowered. The Greek law of spacing may be taught now, and after they understand that dark values must be used in the foreground and lighter values in the distance, they are in a position to carry on their individual lesson in tints and shades of color.

In Grade V, we will take up the principle of Balance in our composition or the power of attraction that one object has over another in size, shape and color. Pupils in this grade in their color study will have learned that a very small area of intense color will balance a very large area of a neutralized tone; and after experimenting with different intensities for backgrounds, will soon realize the wisdom of that other law which warns us against a background more intense than the objects shown upon it. As in color work they are studying complementary color, it is well to limit them to complementary schemes in this lesson. The rule for the margins of a horizontal composition may be given now —widest at the bottom and next widest at the sides and narrowest at the top, as shown in Plate 5.

In Grade VI, Plate 6, are shown movable vase forms which may be in different intensities of any color scheme. These may be used to advantage to teach the principles of correct grouping and how Rhythm may be created in line, form and color. Objects should be placed closely enough to allow the eye to travel easily over the whole group as one unit. Avoid an arrangement that will form a regular succession of steps. This gives an unpleasant movement in a diagonal and tends to destroy unity.

In Grade VII, we are ready to learn a little more of the lines of movement in a composition, and how they may strengthen the center of interest by leading to it or vice versa. In Plate 7, the line of the road, the tree, the hill and the distant trees all carry the eye to the house. The road may be removed and spots of color introduced thru stones, flowers, etc., to show that this also will create a movement which should lead to the center of interest. When a composition has two centers of interest it is bad. To prevent this it is necessary to *subordinate* everything else in the composition, which tends to distract the attention. In Plate 7, have one tree with the "sky holes" elaborately cut out and a second tree of the same color showing no detail. Try the effect of each on the composition. Now add a darker trunk to the second tree and note how it tends to de-

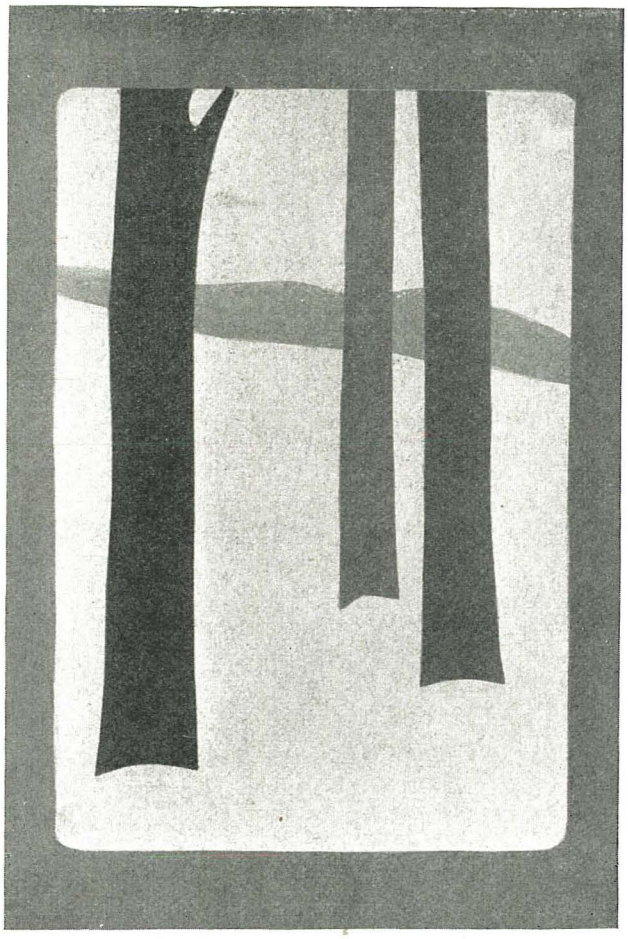


Plate 4. Grade IV. Vertical and horizontal space relations.

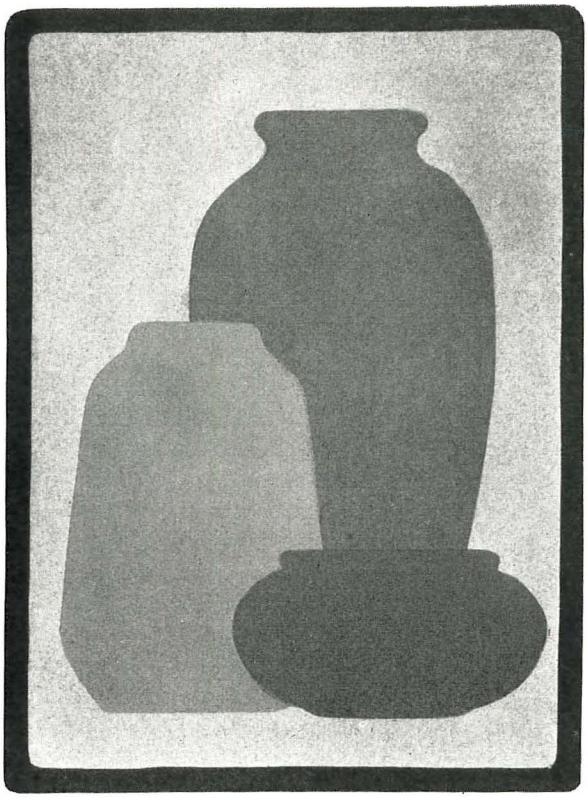


Plate 6. Grade VI. Movement—Correct Grouping.

tract from the center of interest. These experiments will do much toward helping pupils to understand the very important principle of Subordination in Composition, whether it may be in the arrangement of our rooms, the planning of our costumes or arranging for any other of life's activities.

So often we find that pupils while studying the laws of composition from the viewpoint of either a still life group or a landscape, fail to identify one with the other, and to see that it all resolves into the same problem of arranging shapes in spaces, for the purpose of getting beautiful relationships. The idea in Plates 8, 9 and 10, will help to elucidate the problem. Use the cardboard vase forms which may be in three neutral values as shown in Plate 8a. On the reverse side, by the use of black paper, change them to the landscape forms shown in Plate 8b. Review the meaning of composition as applied to all their other work. When they understand that all composition is the putting together or arranging of the parts of anything to make a whole, they will see that whether it is a *good* composition depends on whether the result conveys *one* clear, consistent thought presented in the most beautiful way. Unity is the test, and should be the result of careful compliance with all the principles they have learned in their progress thru the grades. A pupil should be required to make a good still life group after considering the general movement of the forms, the relation of their greatest length to the space, their size and color areas in relation to the background, etc. Now he may reverse the vase forms, turn them upside down and by the addition of the land forms, we can test our rules applied to a landscape in silhouette. This will help pupils to visualize landscape forms as simple familiar shapes, minus the distracting detail. To test the application of their

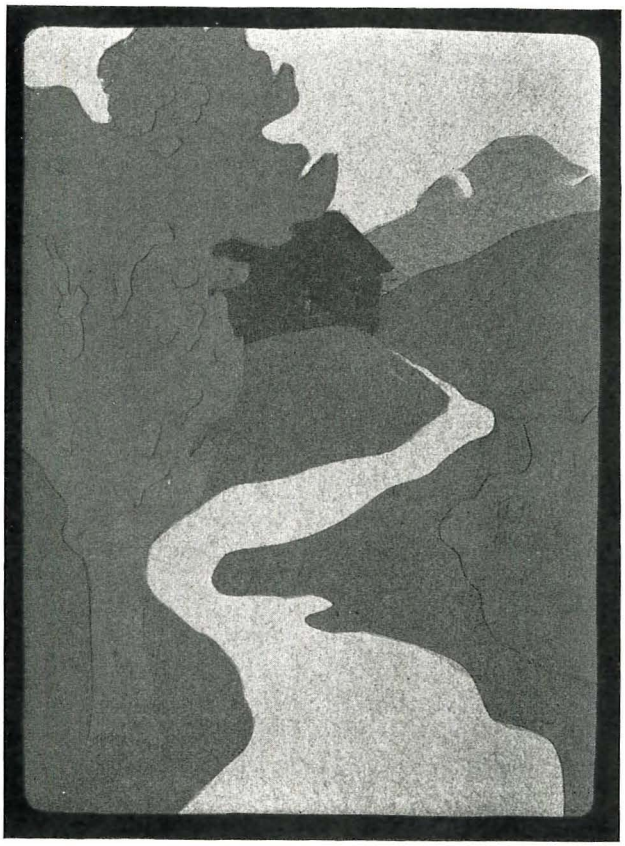


Plate 7. Grade VII. Subordination—Center of Interest.

knowledge still further in a different problem they should be required to find in a magazine or newspaper, preferably in color, a costume illustrating good composition, also one that violates it. A class criticism should follow.

In all of the work, care should be taken that the pupils put into actual practice each principle of composition as it is acquired, so that they will not learn it as something to be used in a drawing lesson, but that the knowledge may become part of their every day lives and cultivate in them an appreciation of beautiful arrangement that will be reflected in everything they do.

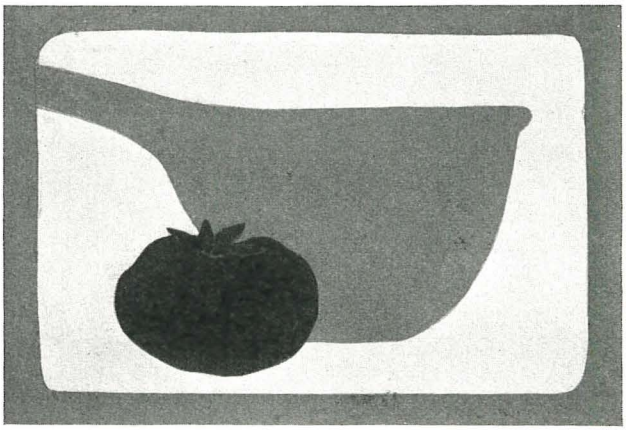


Plate 5. Grade V. Balance—Law of Areas and Backgrounds.

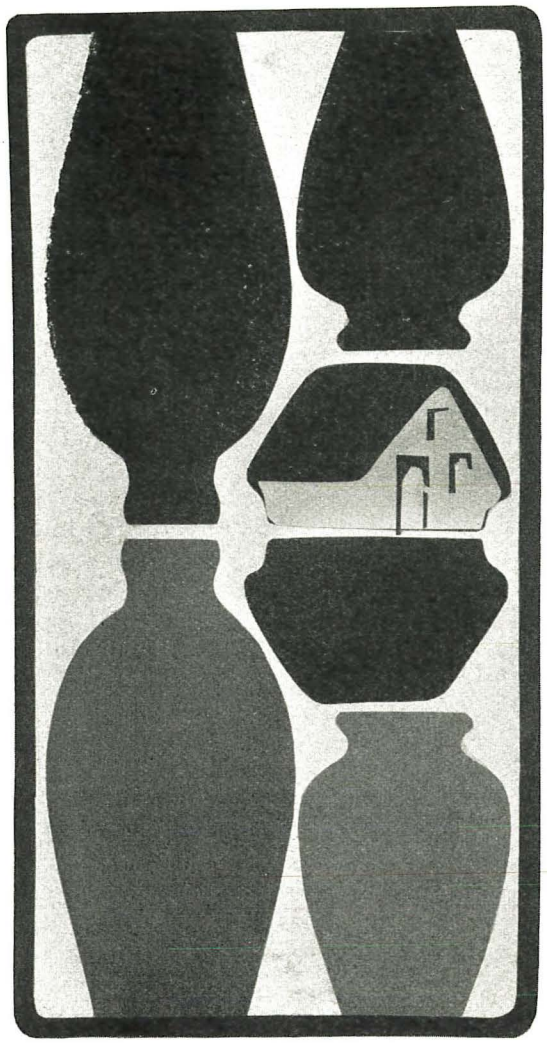


Plate 8. Grade VIII. Vase forms used as Landscape forms in reviewing the Laws of Composition.

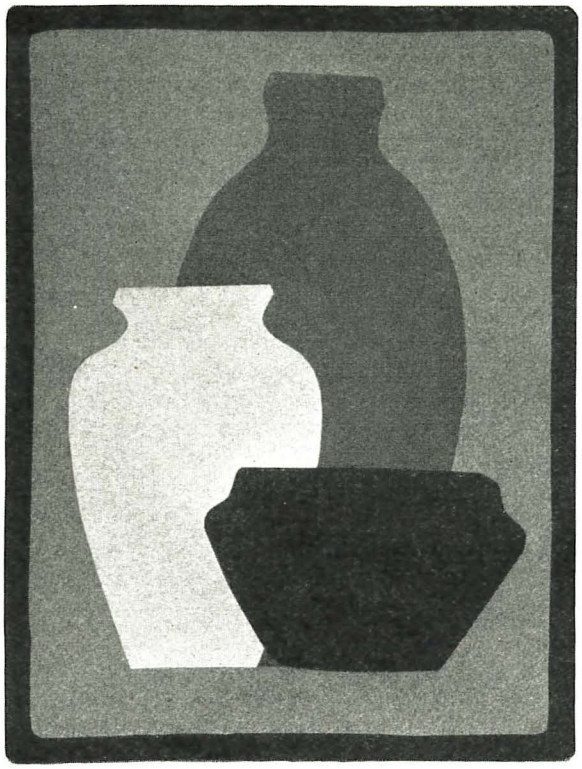


Plate 9. First Arrangement from Plate 8.

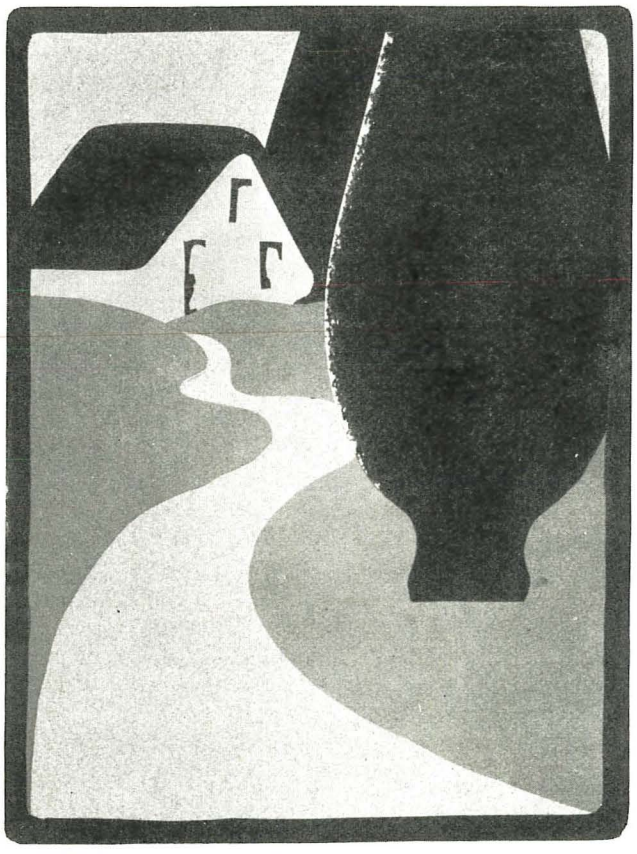


Plate 10. Second Arrangement from Plate 8.

INDUSTRIAL-ARTS MAGAZINE

EDITORIAL

SOME THINGS TO REMEMBER.

It is a good thing at the beginning of a new year to have a few sane and wholesome principles in mind as a kind of life preserver—precautions against the exigencies of the voyage.

Without forgetting that there are numerous other important principles which might be given, we venture to emphasize at this time the following:

A wiser thing has never been said than that the first essential of a good teacher is genuine respect for the pupil.

Boys and girls have minds and individualities of their own. Deal with them accordingly.

Pupils come from different environments; they have different tastes and interests; they have their own particular weaknesses and limitations. Therefore, be patient, considerate, and discriminating. Do not too early begin the dangerous process of trying to fit them all into one little, narrow groove.

Do not be surprised or discouraged if you find a boy who will not go into raptures over a coat hanger or a sleeve board.

A teacher should forget, in a measure, that he is so wise and so important, and really become a helper and a co-worker.

The personal touch is the vital touch. It is the personal influence of the teacher that will last long after exercises, problems, lectures, demonstrations, etc., have passed away.

OUR RESPONSIBILITY TO ART.

The editors of the Industrial-Arts Magazine have received occasionally criticisms on the design of objects illustrated on its pages. These criticisms are gladly received and whenever they may be of advantage to our readers we are glad to publish them. Some of the criticisms sent to us have not been clearly stated and would not appeal to the readers as logical. Others have been destructive rather than constructive.

We have noticed that it is a characteristic of artists to differ in opinion. We have noticed also that it is not always easy for artists to give clear, logical reasons for their differences of opinion.

In the applied arts there is possible a criticism which is based on utility and propriety and which is logical and evident. Beyond this there may be criticism that is based on impressions of beauty independent of utility but which may not be reduced to rule or formula.

Each and both of these criticisms are valuable to the teacher of the manual arts. The first is imperative and the second is desirable. The first may be acquired as a part of the teacher's equipment by study and observation. The second is an acquired taste which responds to pleasurable impressions of form and color but which defies explanation.

If artists did agree we fear they would not long be worthy the name. Like the old lady who was thankful that tastes differed because if people were all alike they would all be after her John; so we are thankful for the differences of opinion among designers and wish to pass them on to our readers.

DO WE TALK TOO MUCH?

It is said on good authority that the fatal weakness of teachers as a class is that they are eternally talking. Recently, the principal of a large high school said of the head of his manual training department: "He is a very capable man; as soon as he matures a little and settles down he will be a good teacher. He bores the boys to death with his talk—his 'lectures' as he calls it. He wastes hours and hours of their time by telling them things about tools, wood, etc., which they either already know or might easily be induced to find out for themselves and report."

Too frequently, we fear, manual training teachers deal out their advance information in too great abundance and in too large doses with the result that much of it is entirely lost and the remainder hopelessly confused. Sometimes several days are taken up at the beginning with long discourses on various woods and their characteristics, and on the numerous tools and their uses. The boys go to the shop for the first time with visions of real, vigorous work with the implements of the shop. We venture to suggest that, especially with grade boys, this eagerness be taken advantage of by getting the actual work started at the earliest possible moment.

We are not inclined at all to minimize the importance of preliminary instruction and demonstration; we are rather given to emphasizing preliminary instruction. But we desire to point out that preliminary instruction should be brief, to the point, and confined to a very few fundamental considerations. Demonstrations likewise should be brief, and should deal only with such fundamental processes as are immediately needed and applicable. So often class demonstrations fail because they cover too much ground, are too long, bring in too much detail, and are not immediately needed by many members of the class.

It is difficult to curb our disposition to squander time by telling what we know, but the good of our business and the happiness and welfare of our classes demand that we do that very thing.

NEED FOR CLEAR THINKING.

It would seem unnecessary to urge upon educators the need for clear thinking and speaking upon any subject. Yet one cannot read or hear many of the addresses of prominent persons upon the subject of vocational education without realizing the need for more careful

discrimination between relevant and irrelevant discussion. This may be caused by ignorance of the problem upon the part of the speakers or by the desire to bring other subjects into the lime light by means of the popularity of the subject under discussion. It is often caused by the desire upon the part of the speaker to bind up the subject of vocational education with certain local controversies, especially in localities where vocational education is the cause of controversy.

One prominent speaker recently stated that vocational education is desirable only when controlled by the proper interests. It would be just as sensible to say that we favor general education only when it is properly controlled (that is, when we control it). The fact that certain commercial interests are very much in favor of vocational education even if they do wish to control it, is no argument against vocational education. The fact that certain interests wish to dictate what shall be taught by the department of economics in the University of Pennsylvania is no argument against the establishment of departments of economics in other places, nor has it any bearing upon the subject of economics whatever. Even the Department of Superintendence passed a resolution to the effect that persons who are not engaged in actual superintendence of school work shall not have a vote in their meetings. This does not mean that the Department has any plans or interests which are inimical to the remainder of the N. E. A.

Another speaker beclouds the issue with a statement that what is needed is not so much education for production as more equal distribution of the world's goods. The problem of the more equal distribution of the products of man's labors has nothing to do with the question of vocational education. The most enthusiastic advocate of vocational education has never dreamed that vocational education is the panacea for all the ills of our social and economic life,—that it is the one pill which will cure everything.

The real issue is this: our schools are intended to prepare every person for the life and work which that person is to live and to do. The schools so far have devoted their attention to that group of boys and girls who are to eventually enter the professions and of late years to those who are to enter business. Those who are going to work without completing the high school in the industries which support the business and professional life of the country, have not been given that education and training which will fit them for competency in the work which they are to do. The immediate task of the schools is to supply that training, and this is not to be accomplished by controversies which end only in ill feeling and inaction. Those states and communities which have not made provision for such training have sufficient to do at home to occupy their attention for some time.

QUALITY AND "QUALIFICATIONS."

In almost every educational convention, one hears considerable about raising the standards of qualifications of teachers. "Raising the standards" usually means a rule providing that every teacher must have graduated from college or a normal school. The standard is based upon a *school attendance* which is by no means a guarantee of superior ability or extraordinary intelligence.

Nearly all large high schools demand a college degree as a requisite for teaching, even in shop and business subjects. No doubt a college education is a very desirable qualification for every teacher, but at the same time some very capable teachers have not been fortunate enough to secure such a training. Under the present rules, Thomas Edison would not be eligible to teach electricity in a high school, Luther Burbank could not teach botany, Henry Ford would not be eligible to teach anything in a high school. Shakespeare himself would not be eligible to teach his own plays. To be sure no superintendent will ever have the opportunity to turn one of these men down as a teacher, but they may refuse some one with equal talents.

A great effort is being made to "democratize" education and much progress has been made in this direction, but the raising of standards based upon school attendance is a move in another direction. The more college work required for teaching the more will teachers be selected from those who can afford the longer period in college and the expense. Thus teachers will be selected more and more from the "sheltered" group who have never known economic stress or the real problems of making a living.

Are school men ready to repudiate the old adage that says that experience is the best teacher, or to assume the position that education can be gained only in school or from books? Those who have known the school of experience may do so, but the rank and file of men in business and industry know better, and they have the final vote in the matter.

The difficulty attending the adoption of hard and fast regulations concerning the qualifications of teachers is that no provision is made for the exceptional teacher, and oftentimes the exceptional one is the most desirable one. When no iron clad rules are observed superintendents are often urged to appoint persons of very little ability or push and very much pull. The rule in such cases is an excellent excuse for the superintendent but school officials should have the necessary amount of firmness and tact to refuse the appointment on the true basis of lack of teaching ability. The rule is also a benefit to normal and college graduates who might not be able to secure appointments on the basis of intelligence or ability, and to a normal school which could not secure positions for its graduates without the rule.

The schools unquestionably need a better quality of teaching and more capable teachers, but these are not to be secured by raising the standards of scholastic attainment of teachers. Teachers should be selected on the basis of character and intellectual and teaching ability, and not on the basis of economic resources sufficient to allow them to remain in college a long period of years. Each applicant and each position is a special case and no rule will fit every case. A man does not need to have studied differential calculus or to have written a thesis on industrial education, to teach bricklaying or plumbing.

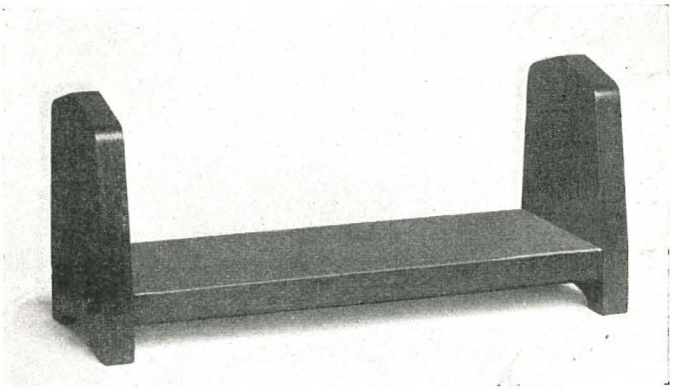
HOW IT WAS DONE!

The purpose of this Department is to present monthly a wide variety of shop projects which have been actually worked out in elementary, high, trade and continuation schools. Contributions are solicited and will be paid for—THE EDITORS.

A BOOK RACK.

Harry W. Anderson.

THIS book rack is of plain design and simple construction and makes a welcome addition to the library table. The ends are sawed out on a band saw if convenient, or else with a turning saw. The edges should then be smoothed up nicely with a wood file and sandpaper. Square up the bottom board carefully. The ends are fastened to



The Completed Book Rack.

the bottom piece with screws, the screw holes being counterbored to a depth of 7/16", and $\frac{3}{8}$" pins inserted which should project a good full $\frac{1}{8}$". The book rack is then sandpapered and acid stain applied as described.

Book Rack—Bill of Material.

Oak.

2 pcs. $\frac{7}{8}$"x6$\frac{1}{4}$"x7$\frac{1}{4}$"—Ends.
1 pc. $\frac{7}{8}$"x6$\frac{1}{4}$"x15$\frac{1}{2}$"—Bottom.
4 1$\frac{1}{2}$" screws and washers.
1 pc. $\frac{3}{8}$" round for pins.

A NEW USE FOR THE RUCCO BLOCK.

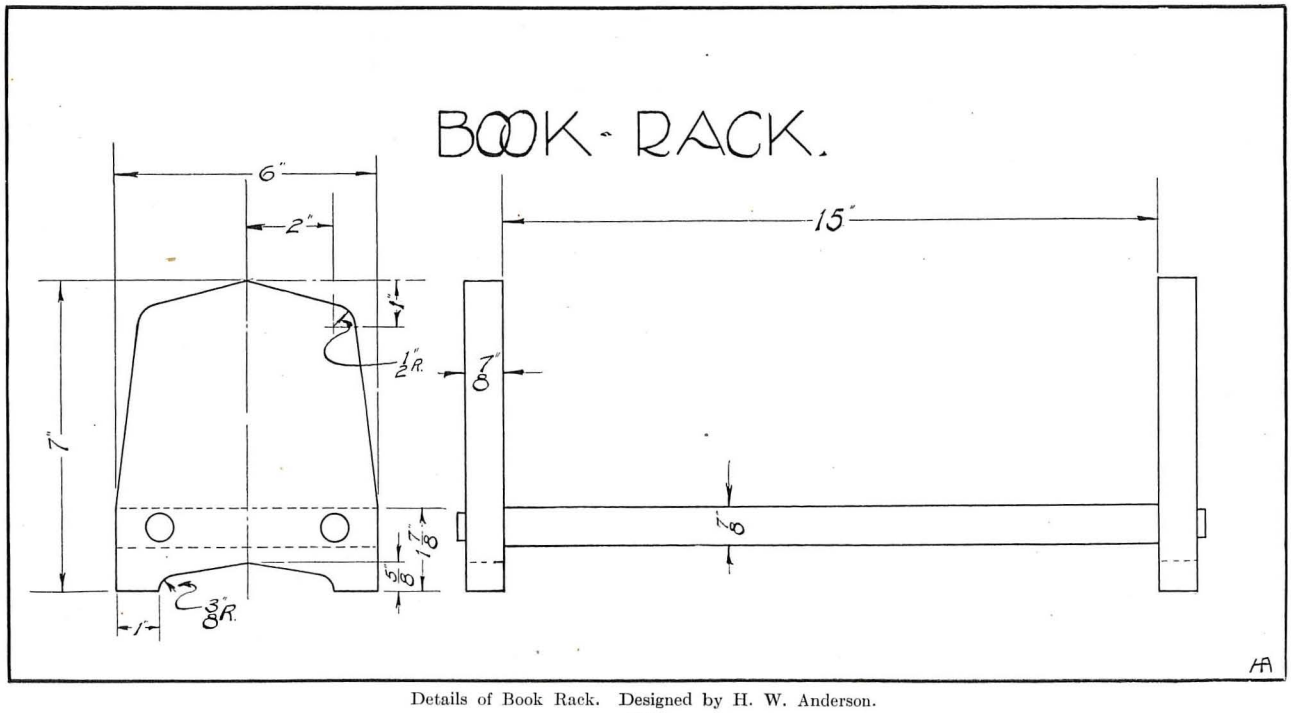
Elton F. Clifford, South Haven, Mich.

In getting out cover designs for a school paper, a new and interesting use of the rucco block was found as an accessory to printing. The Method of carrying out the problem and the results obtained are explained in the following paragraphs and the accompanying illustration. It should be of interest to art teachers and instructors of printing who have had difficulties in securing simple, attractive designs on short notice for illustrative purposes.

The rucco block is a composition mounted upon burlap, and is about one-quarter of an inch in thickness. Its advantage over wood is that it has no grain which is apt to split, and that it is much easier to cut. The surface of the block is rough, and so has a tendency to influence the student to use simple designs of good, strong lines that will produce pleasing and attractive results. It is, however, possible to work out fineness of detail if great care is taken.

To begin with, the student should trace a simple design upon the surface of the block. Then the parts that are not to print can be cut away. This should be done by cutting the outline of the design with the point of a sharp knife to a depth of about one-eighth of an inch, then cutting away from the outline at an angle in the surface to be cut away. This will leave the design standing out clear in outline, and the surface to be cut away can be readily routed out, using no care as to the smoothness of the background, so long as it is low enough so that it will not interfere with the printing. If the cutting edge of the knife is very sharp it will aid greatly in the cutting of the design, making the work easier and more accurate.

In preparing the rucco block for the press the following plan is best carried out. After the design has been cut upon the block a wood base should be prepared by planing a piece of soft wood down to the size of the rucco block, leaving it about three-fourths of an inch in thickness. The surface should be perfectly smooth and exactly level. The surface upon which the mount is to be placed should then receive an application of glue and the rucco block placed upon it with the back in contact with the glue-coated surface. A smooth, level surface such as a well planed board should then be placed over



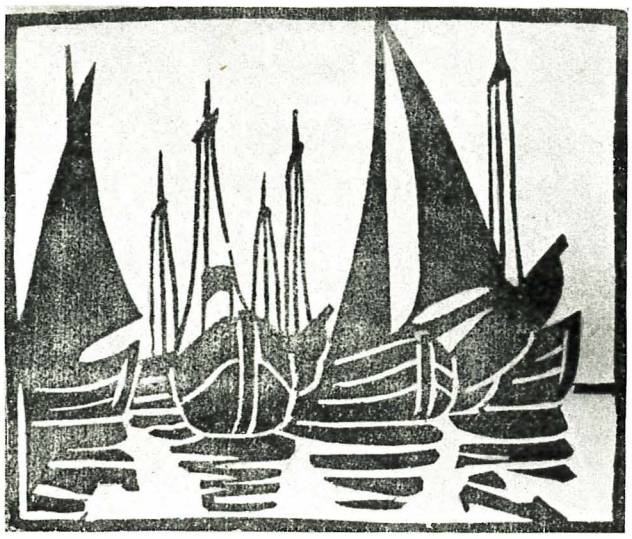
Details of Book Rack. Designed by H. W. Anderson.

the design and the mounting put under pressure until the glue has thoroly set. When dry the mounting can be removed and the back of the wood block planed down to slightly less than the height of type. The mount can be raised to the required height by the addition of underlay on the back.

The block is now ready for printing, and a trial impression may be made. If it is found, on making the first impression, that there are thin spots in the design, this may be remedied by planing the surface of the design with a wood plane. The plane must be very sharp and adjusted very fine; and a great deal of care must be exercised on the part of the student to avoid injuring the design. This will give the form a much smoother appearance of surface, which is more desirable for printing. After printing it is not necessary to wash the block, but if the ink is allowed to dry upon the surface of the design, it has a tendency to fill up the surface, making it more firm and adding to its printing qualities. Unlike type metal and other forms of metal printing plates, the rucco blocks, owing to the elasticity of composition under pressure, retains its sharpness after making a great number of impressions.

If two or more colors are desired in the design the required number of blocks can be cut, cutting away all but the surfaces representing the color to be printed by each block. It is possible to get three or even four colors from two blocks by letting the tone of the paper represent one color, each of the blocks represents a color, while the fourth color can be introduced by overlapping the two colors of the blocks. This, however, requires careful planning in the application of the design on the part of the student.

The accompany illustration is a design in silhouette produced by printing with a dark toned ink on light toned paper from a single block.

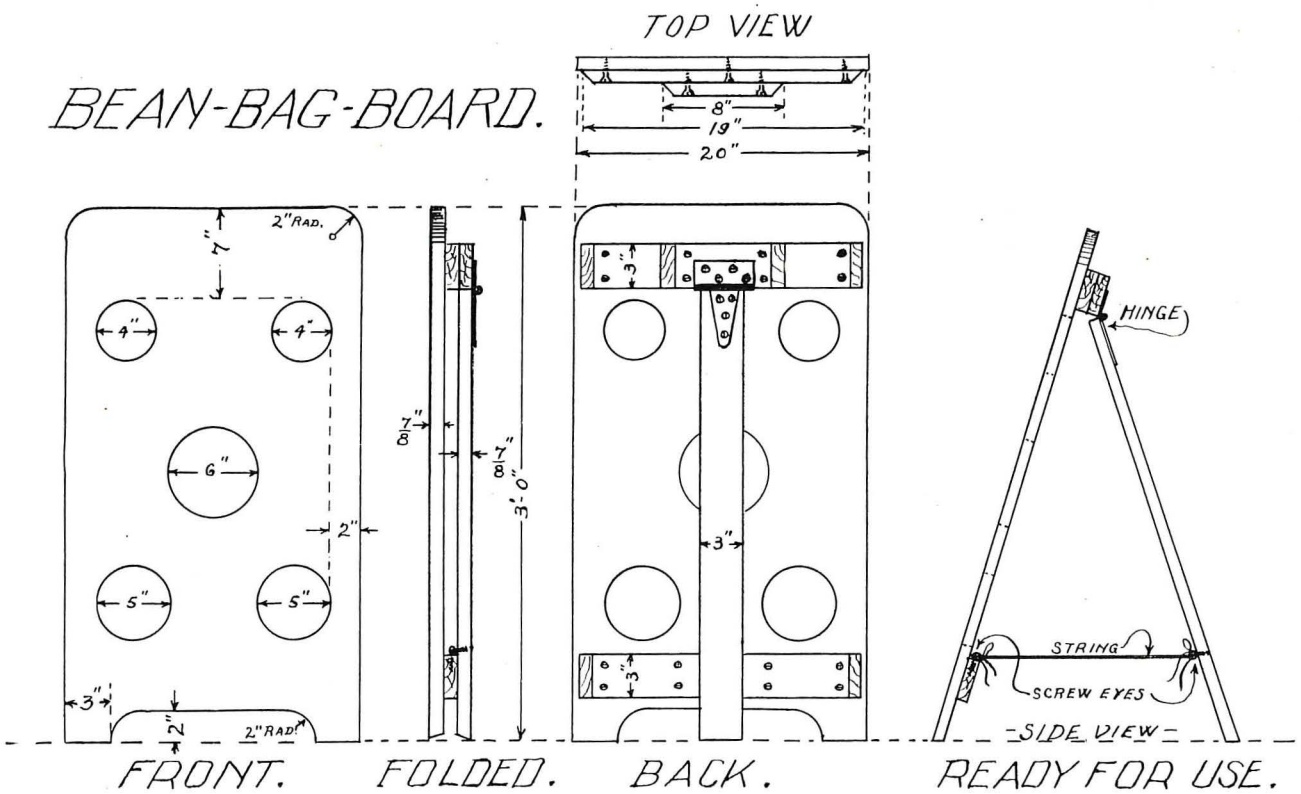


A Design Worked on Rucco Block.

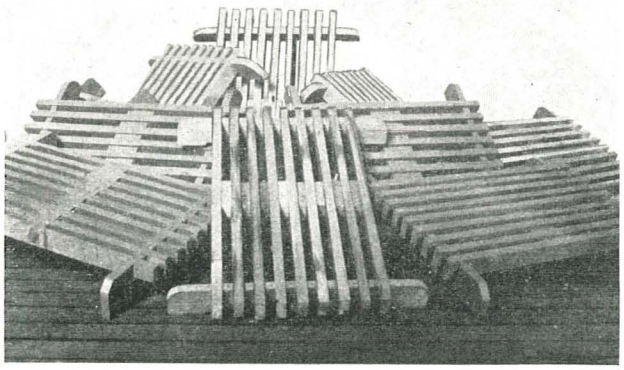
BEAN BAG BOARD.

Arthur Kinkade, Decatur, Ill.

THIS problem could with good results be placed in the eighth or ninth grades for execution. The model is designed for use in the lower grades in connection with indoor recess programs, or for a motivating influence in number work. The holes can be numbered and the arithmetic work of the youngsters combined with an organized game. The detailed drawing is self-explanatory to any shop instructor, and will need but little description. The width of the board precludes the use of single width material, therefore it becomes necessary to introduce some method of joining the separate pieces together. In well equipped shops, I should recommend the glue-joint and dowel-pin method. A power sanding machine could be utilized to good advantage here. This piece of work will, if carefully constructed and finished, make a splendid addition to the equipment of any undergrade schoolroom.



Details of Bean-Bag Board. Made by Students in Decatur Grade Schools.



A Pile of Scraper-Mats.

A SCRAPER MAT.

W. W. White, Independence, Ia.

THE scraper mat is a useful project and a splendid problem for the grades, since it paves the way to the cross lap joint and other careful sawing and fitting.

Hard pine seems the best wood, altho softer woods are more easily worked. In laying out the end brackets it is best to find the exact center and lay off the $\frac{7}{8}$" measurements each way. If the stock is not over $\frac{7}{8}$", $\frac{3}{4}$" is used. When the spaces are correctly measured, place both brackets in vice and square across both; gauge for depth and square to gauge line. Before cutting out the dado nail the parts that are to remain, using 6d finish.

The slats are left rough on the edge until the entire mat is assembled; then it is planed diagonally to make it level.

The dado is never made larger to fit the slat, but the slat is planed on the sides to fit the dado.

The finish is a coat or two of mud-colored paint.

THE MAKING OF TEA TILES.

Richard T. Johnstone, Montclair, N. J.

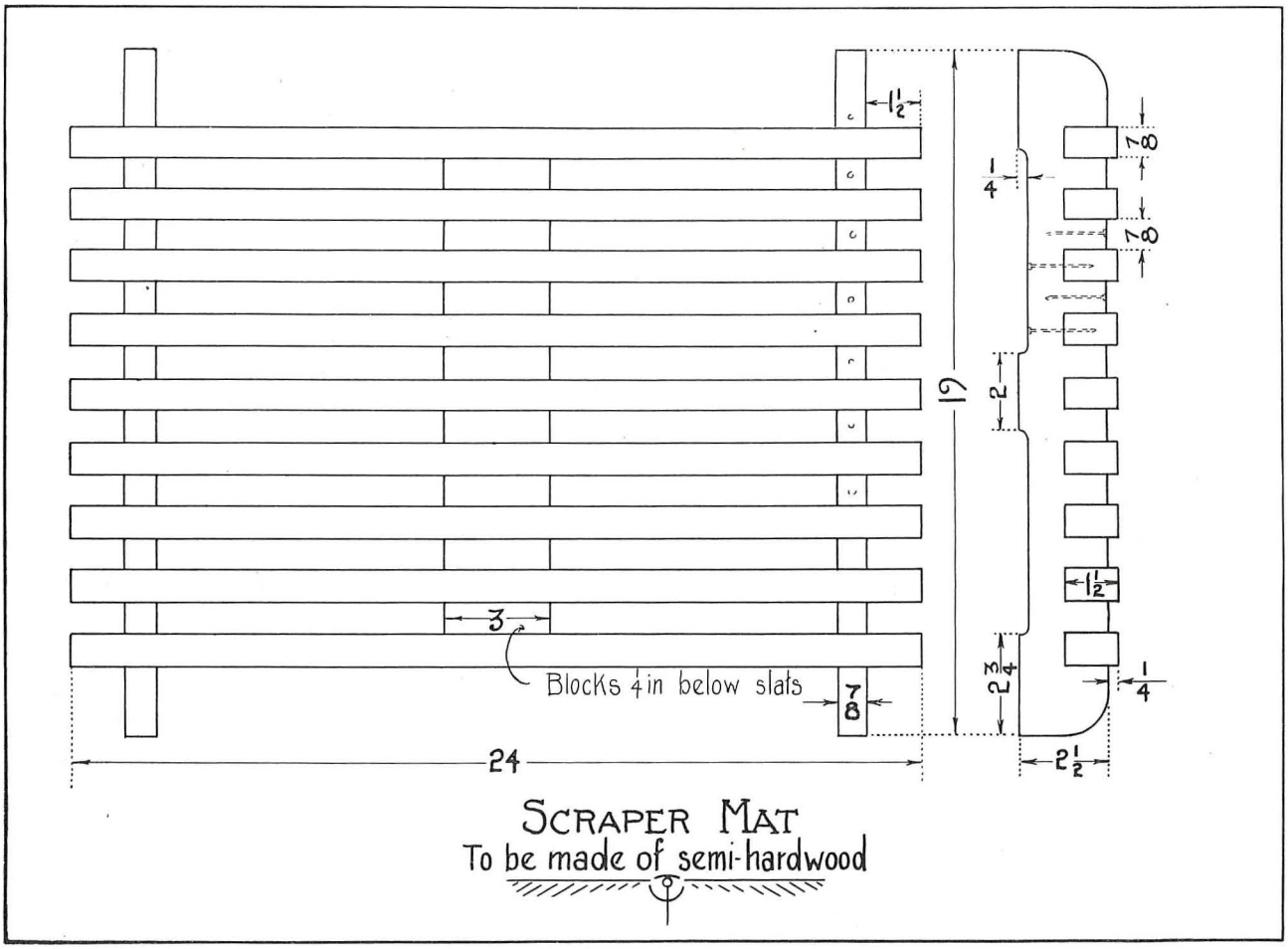
IN the INDUSTRIAL-ARTS MAGAZINE for July, 1914, there appeared an interesting article by L. L. Winslow on tile making. I have worked out the same problem in a different way which has proven successful and practical in the seventh grade.

This method preserves the individuality of the student as the design is worked out in the classroom under the direction of the drawing teacher. The design should be made in two colors, or one color and white.

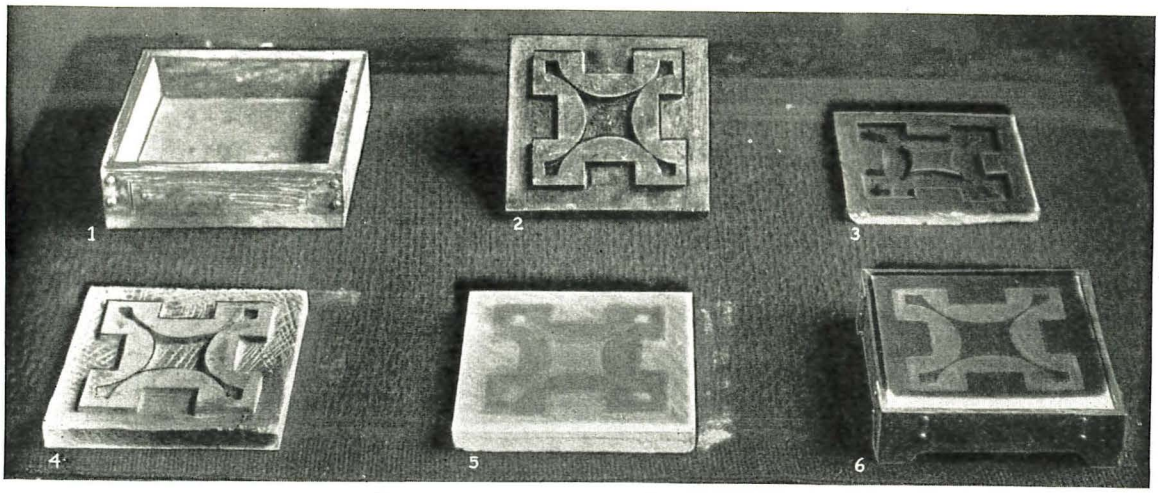
We are limited somewhat in coloring materials for Portland cement, but I have used dry colors successfully in tinting Keene's cement obtaining almost any desired tint.

Practically any design that can be cut out of quarter-inch basswood with a coping saw can be used. The design is traced and cut. The edges should be sanded and the whole given two or three coats of shellac. Nail on to a piece of one-half inch poplar made to fit the inside of the box as shown in Figure 2. A handle is screwed to the back, which does not show in the photograph.

Place a layer of modeling clay in the bottom of the box (Figure 1) about one-quarter of an inch thick. It can be pressed down with the fingers and then smoothed out with a small straight-edge. The clay should be soft enough to take the impression of the mold, which is well oiled and pressed evenly on the clay in the box. On removing the mold a good impression of the design about one-quarter of an inch thick should be the result. While the clay is wet, the cement should be mixed and poured



Details of Scraper Mat.



Details of Tea Tiles.

even with the top of the box and allowed to set for 24 hours. It is then taken out of the box and the clay removed, showing a form similar to Figure 4. Any imperfections can now be touched up with a knife.

It can now be replaced in the box, design side up, and cement of a different color can be poured according to the design. It should again set for 24 hours. After it is sufficiently dry, the tile can be smoothed down with a file and sanded.

Figure 5 shows a finished tile. It does not show well in the photograph because the dark shade was a tint of blue. Figure 6 shows a tile made of white and natural color Portland cement enclosed in a copper frame or stand.

A FERRY?

Edward H. Crussell, Sacramento, Cal.

BEFORE attempting to offer any suggestions for the help of *Manual Training Teacher, N. J.*, whose query appeared in the August issue, I would like, in a friendly way, to draw the correspondent's attention to the lack of necessary data in his letter.

About all he says is: "There is a mainland with an island one hundred feet away to be connected in some inexpensive way without building a bridge.

Any person making an endeavor to solve this problem from a distance has too many things to guess at. Is the river navigable for common carriers? Do they pass thru between the island and the mainland? Is there a current? Is it strong or weak? Is the channel deep or shallow? How much land does the correspondent own, or has a right to on the mainland above the ferry?

All the points, and others not mentioned, have a bearing on the matter at issue, and must be considered by anyone attempting to solve the problem.

We may safely assume that, being a teacher of manual training, the correspondent has, at least, the average share of intelligence, and yet, altho he knows all the local conditions, he finds it necessary to apply for outside assistance. How, then, is the outsider who knows nothing of these conditions, going to be able to help him except by making several guesses, one of which may possibly be right?

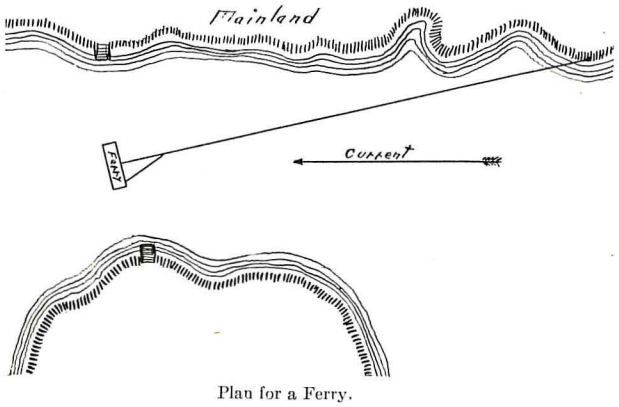
The correspondent doesn't even give his reason for not wanting to build a bridge, and the reader is left in doubt as to whether it is because of the cost; or the necessity of leaving a clear channel, or because of the difficulty of the undertaking.

Given still and shallow water (five feet or less in depth), a dirt or sand bottom, and permission to block the channel, it is possible that a small foot bridge would be the best and, in the end, the cheapest solution.

With a strong current and deep water a very good solution is shown in the rough sketch. It consists of a ferry-boat attached to a cable which is anchored on the mainland bank some distance above the point of crossing. This distance may vary according to local conditions, but the cable should not be less in length than three times the width of the crossing.

The cable is attached to the center of the side of the boat, and the latter is held at the correct angle by means of another line, one end of which is fastened permanently to the cable and the other fastened to the forward end of the boat. This line is changed from one end of the boat to the other at each crossing, and the pressure of the current forces the boat toward that side which is pointing highest. Floats should be fastened to the cable to keep it out of the water, and a landing built on each bank after the cable has had its final adjustment.

The ferry-boat is best built in the form of a raft, or pontoon, with a handrail on each side. The passengers either stand up or sit on chairs. The boat may be about five feet wide by sixteen feet long, or as much larger than this as seems necessary. Its building presents no difficulties to the average woodworker, and it is handier and safer than the ordinary rowboat.



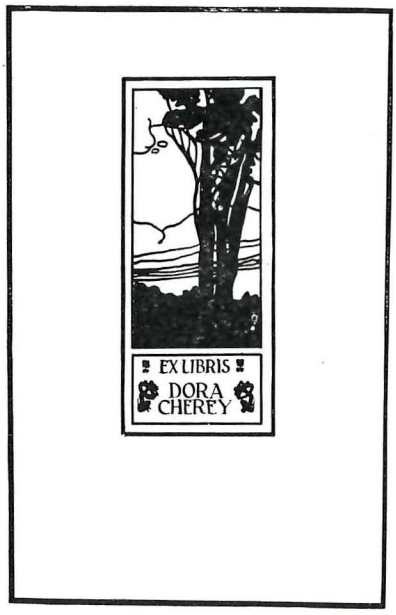
Plan for a Ferry.

If there is no current, and no necessity for keeping the channel open, this same style of ferry-boat may be attached with sheaves to a cable that runs straight across the channel and pulled back and forth by means of a handline. The cable should be suspended above the water, and the sheaves that run on it attached to the boat with ropes or lines.

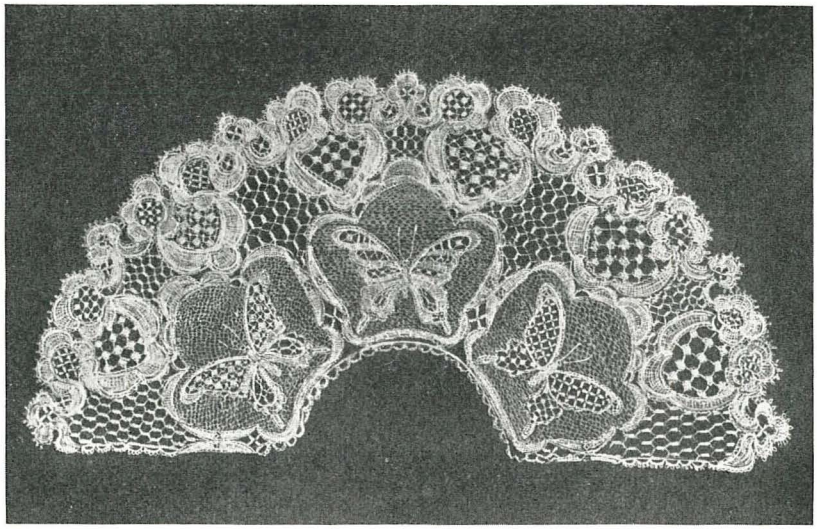
If this answer, or some one of the others, does not supply what Manual Training Teacher requires, I shall be pleased to write again if he will state more definitely his conditions and requirements.

INTERESTING STUDENTS' WORK FROM THE INDUSTRIAL ART CLASS OF THE NEW YORK UNIVERSITY SUMMER SCHOOL. SUMMER SESSION, 1915.

One of twenty panels of work displayed at the annual exhibition of the Summer School, July 23, 1915.

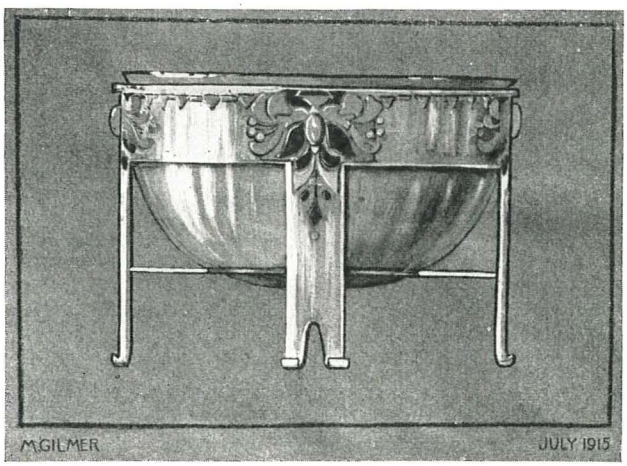


Design for a Book Plate. Dora Cherey.



Design for a Lace Fan. Alice E. Hobbs.

THE ILLUSTRATIONS on this page are examples of the work done by students of the New York University Summer School under the direction of Dr. James P. Haney, Director of Art, in the New York City High Schools. The course, which continued for three weeks during July, covered "Practice of Design" and was intended not only for teachers, but for young people who intend to take up commercial art. In addition to the general lectures and the personal teaching, the students prepared designs for use in the crafts, and received daily criticisms and personal help. A total of 142 students were enrolled.



Design for an Enameled Silver Bowl. Mary R. Gilmer.

INDUSTRIAL EDUCATION DISCUSSED

Excerpts from Addresses before the National Education Association, Oakland, Cal., Aug. 16-28, 1915

SOCIAL ASPECTS OF VOCATIONAL EDUCATION.

All education, including vocational training, is social in its origin, and has characteristic group meanings, even for the individuals; the method and processes of vocational education being sharply distinguished from the individualistic methods of the traditional school.

Vocational education finds its excuse for being in the relatively new and almost complete dependence of modern industries, commerce and government upon applied sciences; the need for vitalizing the problems of getting a living; and the recognition of a body of skilful, intelligent workers as a community asset. The movement for vocational education is social in its origin and in its realization. Ignorance of facts and the principles of industry, and incapacity to fit one's self to any needed service, are so common as to justify one in thinking them foster parents of poverty. And it is believed that both of them might be measurably eliminated by a wisely administered system of occupational training and guidance. All vocational education must be such as to meet real social and economic needs, otherwise it becomes a luxury. The appeal to the life, or vocation motive, characteristic of such training, adds the creative element as a determining factor, that is also almost wanting.—*R. G. Boone, School of Education, University of California, Berkeley, Cal.*

ART IN ITS RELATION TO OUR INDUSTRIAL LIFE.

With the civilized world engaged in a life and death struggle for commercial supremacy, this nation is confronted with the most stupendous problem in its history.

Our social and industrial fabric is rent asunder by the forces of materialism as they grapple with man's inherent demand for standards of beauty and spiritual ideals.

Art is a quality or state of mind in which harmony is the result of laws obeyed. Beauty is this art quality externalized in material objects. Its presence is spontaneous and must be conceived before it can be expressed.

We must, in the near future, not only supply ourselves with the textiles, furniture, carpets, wall papers, clothes and other necessaries furnished by Europe; but we shall in many instances be asked to supply South America and Europe itself.

In matters of material resource, mechanical skill and physical energy, we are ready. In matters of art, we are crude, uncertain and worst of all satisfied. Until there is a changed attitude, we cannot compete; for the art quality is as essential to man's perfect satisfaction, as any material quality can be.

It is the business of education to adjust people to the needs and conditions in which they find themselves. The function of art education now is to meet successfully this impending issue.

The solution of this problem lies first in understanding and acknowledging that these conditions exist; second in awakening to a true knowledge of what art is and to its function in the industrial fields of life and third to cancel dead traditions in methods of art instruction and make it live founded on the everlasting principles of beauty, which is harmony in all things.—*Frank Alvah Parsons, President of the New York School of Fine and Applied Art.*

VOCATIONAL EDUCATION.

It is the purpose of this address to show that vocational education, in order to be successful, must include much more than the mere making of skilled tools out of our children. Our capitalists have already robbed our forests and our mines and the natural resources of our country generally, and now we are asked to accept a system of education which looks to the exploiting of our children. To train boys and girls to become mechanically efficient will not solve the problem arising out of the ever-increasing number of strikes and labor wars going on in the United States. The greatest problem before the American people is not how to train boys and girls to produce more goods and better goods in shorter time and at less expense, but the real problem is the question involving the distribution of the goods which we already produce.

We cannot hope to hold the material blessings which we now enjoy in the United States unless our schools are able to more fully socialize our people. This quarrel between labor and capital cannot always go on. It will not be solved by vocational schools that have material production as their goal. The need of the present hour is a vocational school that is able to take due cognizance of the industrial strife that is being waged so bitterly between "those that have and those that have not." This means that the vocational school is dependent upon the cultural training of the elementary school, and that the vocational school curriculum itself must devote a large part of its time to the study of the problems connected with wages, citizenship, democracy.—*Frederick W. Roman, Professor of Economics, Syracuse University, Syracuse, New York.*

INDUSTRIALISM AND EDUCATION FOR THE LAND.

"Our modern industrialism has made us think lightly of the land. We flock to the great industrial centers on the least excuse, or leave the lands of the old East and South after having exploited them of virgin fertility, going to the newer lands of the West to repeat the follies accomplished in the old East.

"What is needed today, then, in every part of the United States is a new kind of a school set in the midst of the rural community by the open country or rural minded village which will honestly do the work needed to prepare the youth living there for understanding the soil, honoring it, and making the most of it, and schools which in a similar way will extend educational opportunities to young people beyond ordinary school age, and even the old folk, who may need the school of inspiration and assistance to help them thru the hard places of life."—*Harold W. Foght, U. S. Bureau of Education.*

VOCATIONAL GUIDANCE.

"There is visible progress in the number of attempts at vocational guidance; a notable improvement in the attempts that are being made to help people in choice of vocations, and a desire to be open-minded on the whole question. The most important of all is the school connection with vocational guidance.

"Heretofore most of the activity has been outside the schools. Now it is coming inside and must be recognized as a school problem that affects school methods, school courses and school organization, from the kindergarten to the university.

"The school is the one agency that can, in the long run, do the work of vocational guidance. Other agencies will be helpful to get it going, and other agencies can cooperate with the schools in doing it; but the boys and girls must select their own life careers, guided by the schools. The guidance in the schools must be of a kind that will show how human society is organized; the dignity and worth of all human service, and the importance of everyone contributing to the common welfare.

"Selecting a vocation on such a basis will never be a final, definite process, but it will be infinitely better than the present hit-and-miss method whereby society bungles thru its job."—*W. Carson Ryan, Editor, U. S. Bureau of Education.*

NEW BOOKS AND PAMPHLETS

Education for Industrial Workers.

By Herman Schneider. 98 pages, cloth. Price, postpaid, 90 cents. The World Book Company, Yonkers-on-Hudson, New York.

The present volume is the latest of the School Efficiency Series, edited by Professor Paul H. Hanus, which embodies the reports of the different investigators of the New York City School Survey. Dr. Schneider's Education for Industrial Workers is a reprint of his report on the status of vocational education in New York City schools. The book considers the conditions of modern industry and how best to prepare children for earning their living under these conditions. The difference between energizing and enervating occupations is made clear. What vocational and continuation schools are, and what they can do to train for energizing occupations and to counteract the tendency to drift into the enervating lines of work, are subjects on which Dr. Schneider has valuable conclusions to offer.

Institution Recipes.

By Emma Smedley. Cloth, octavo, 248 pages. Price, $1.25. Published by the author, at 6 E. Front St., Media, Pa.

The author, who is superintendent of high-school lunchrooms in Philadelphia has developed the present book as a result of her experience in her present work and as head of the domestic science department at Drexel Institute and as instructor in dietetics at the Johns Hopkins Hospital. The work is, therefore, the result of many years' teaching and practice in school and institution kitchens and has this important merit,—every recipe has been actually used with success and is economical, hygienic and appetizing.

The book contains a large amount of information on the organizing and equipment of school lunchrooms, tables of weights and measures, outlines of menus, descriptions of the chief foods and beverages and tables of comparative food values.

The book, of which the present edition is the second, should prove of value to every institution and school cook and to every domestic science teacher who must supervise the school luncheons.

Family Account Book.

Cloth, 10 by 8 inches. 30 pages. Price, 50 cents. Published by the Household Economics Club, 24 South 10th St., Newark, N. Y.

The teacher of household management who is seeking a family accounting system will find the present book simple, inclusive and flexible and well adapted for the average American family. The book is printed on a good grade of paper and substantially bound.

Working Girls in Evening Schools.

Mary Van Kleeck. 12mo, 258 pages. Price, postpaid, $1.50. Survey Associates, Inc., New York.

This book is an intensive view of the workers in the many fields of employment represented among the women who attend evening schools in New York City. As a study of wage-earning women who are seeking to supplement an inadequate education, the facts given relate especially to the problems of industrial training.

The data was secured from answers given by nearly fourteen thousand girls in New York evening schools. Its significance lies in showing the variety of occupations from which these workers come, and the evening school work which has proven beneficial to persons in these occupations.

To persons interested in evening school education for women and girls, this book will be of unusual interest and assistance.

Principles of Cooking.

Emma Conley. 206 pages. American Book Company, New York.

This book is intended as a textbook in cooking and elementary food study for secondary and vocational schools. It is not merely a compilation of recipes, but is a text giving reasons for every process in the preparation of food. It describes the equipment necessary for teaching cooking, illustrates food values in striking diagrams, and readily comprehended and easily remembered charts.

It will prove a valuable book for the teacher of cooking in either a city or rural school.

Wages and Regularity of Employment in the Cloak, Suit and Skirt Industry. With plans for apprenticeship for cutters, and the education of workers in the industry. Report of the United States Bureau of Labor Statistics No. 147. This report of two hundred pages describes the study made by Mr. Charles H. Winslow in these industries in New York City and Boston.

Industrial Club Work of Oregon Boys and Girls, prepared by the State Department of Education. Co-operating with the Oregon Agricultural College and the United States Department of Agriculture. An interesting booklet describing county school exhibits and recording the successful club work undertaken in the state. The booklet will be found particularly helpful to teachers who are undertaking any of the forms of club work suggested by the United States Department of Agriculture.

Why Teach Drawing? Walter Perry Scott. Contains ten reasons why drawing should be taught in the elementary and high schools. Copies will be sent gratis by Atkinson, Mentzer & Co., Chicago.

The Possibility of Vocational Training in the Paper Box Industry, the Candy Industry and Department Store Work and the Wage Value of Vocational Training. Four investigations made respectively by Robert J. Leonard, Anna C. Phillips, Iris P. O'Leary and W. A. O'Leary for the New York State Factory Investigating Commission, Appendix VI of the Fourth Report of the Commission. These studies were undertaken to analyze three typical occupations, usually classed as unskilled, to determine the knowledge and skill required by the workers, the possible advancement of workers and the vocational training which might be offered to help them. The final section proves by a study of the graduates of a number of prominent vocational schools that while a distinct tendency to higher wages results from vocational education the actual money value cannot be established.

A Comparative Study of the Salaries of Teachers and School Officers. U. S. Bureau of Education, Bulletin 658. A valuable report by a committee of the National Education Association. It contains the study made in 1904-5 and shows again that teachers are underpaid as compared with other occupations—particularly other public employes.

Report of the State Director of Industrial Education for New Mexico. By Miss Manette A. Myers, director. In addition to a general survey of the general industrial work promoted by the state department in the form of industrial clubs, agriculture, domestic science and manual training, the report contains outlines and descriptions of the special activities in the respective counties. The pamphlet is fully illustrated.

The Machine Industry. Bulletin No. 1, Rochester Vocational Education Department. A brief statement, for prospective apprentices, of the opportunities and pay in the machinists' trade.

BRIEF ITEMS OF INTEREST

PREPARE MANUAL TRAINING COURSE.

An outline course in manual training has just been accepted by the Oregon State Department of Public Instruction for the seventh and eighth grades and the first two years of the high school. The author of the course is Mr. Frank H. Shepherd, Assistant Professor of Industrial Education in the Oregon Agricultural College.

The course as written calls for the following:

7th grade: Bench Work in Wood and Elementary Shop Drawing.

8th grade: Carpentry Construction and Cabinet Work, Elements of Architectural Drawing and Mechanical Drawing.

1st year high school: Bench Work in Wood and Mechanical Drawing.

2nd year: Carpentry and Architectural Drawing.

Freshman Year.

1st Semester: English. Algebra. Mechanical Drawing 1. Bench Work in Wood 1.

2nd Semester: English. Algebra. Mechanical Drawing and Design 1a. Bench Work in Wood 1a.

Sophomore Year.

1st Semester: English. Algebra. Architectural Drafting and Design 2. Carpentry 2.

2nd Semester: English. Geometry. Architectural Drafting and Design 2a. Concrete Work 2a.

Junior Year.

1st Semester: English. Geometry. Machine Drafting and Design 3. Woodturning and Pattern Making 3, or Machine Shop Practice 3.

2nd Semester: English. Shop Mathematics 3a. Machine Drafting and Design 3a. Forging 3a.

Senior Year.

1st Semester: American History. Shop Mathematics 4. Adv. Shop Drafting and Design 4. Woodwork (Carpentry 4) or (Cabinet Making 4) or Ironwork (Forging 4) or (Machine Shop Practice 4).

2nd Semester: Civics. Vocational Study 4a. Woodwork Carpentry 4a) or (Cabinet Making 4a) or Ironwork (Forging 4a) or (Machine Shop Practice 4a).

A STUDY OF MANUAL AND DOMESTIC ARTS IN THE SCHOOLS OF 156 CITIES.

STATISTICS on manual and domestic arts teaching in the schools of 156 cities of the United States have recently been collected by Mr. Charles L. Harlan and Mr. Joseph C. Park, of the State Normal School, Oswego, N. Y. The information is in the form of charts and tables, and includes a discussion of these subjects from different points of view. The information will shortly be issued in pamphlet form by the United States Bureau of Education.

The topics covered by the investigators are:

1. Nature and character of the work in the grades and high school.

2. The number of minutes per week given to these subjects.

3. The percentage of total school time given to these subjects.

4. The different methods used and their adaptation to the age and grade of pupils.

5. The nature and amount of correlation with other subjects.

6. The methods of disposing of the finished products of the shops and kitchens.

7. The dominant aims in teaching these subjects and the prevalence of each.

8. Enrollment in vocational courses in elementary and high schools.

9. Cost per pupil for maintenance and operation in the different schools and cities.

10. The value of the equipment, per pupil, in the different schools and cities.

11. The percentage of pupils entering the work for which the manual arts and homemaking courses prepared them.

12. Forms and standards of practice in use in the schools.

THE WORK OF ONE MANUAL TRAINING DEPARTMENT.

SCHOOL furniture and equipment exceeding in value $2,000 was built during the past summer in the school shops of Evansville, Ind. Ten students and two teachers worked eight weeks and five additional teachers spent several weeks in the shops. The furniture was designed entirely in the shops and every operation from the first sketches to the final finishing was done by the boys and the teachers. The products of the summer are:

24 Four pupil work benches.
10 Two pupil work benches.
16 Six pupil sewing tables.
10 Long typewriter tables.
32 Steel frame drawing tables.
13 Cabinets for boys' work.
5 Cabinets for tools.
55 Steel frame stools.
1 Cabinet for drawing instruments.
1 Cabinet for books and supplies.
3 Large lumber racks.
40 Gymnasium benches repaired.
140 Tee squares.
300 Drawing boards.
100 Bench hooks.
98 Squaring boxes for sawing.
100 Bench stops.
4 Shower bath mats.
3 Gear guards for machines.
40 Boxes for drawing materials.
5 Pump piston rods returned.
2 Glue pot tables.
1 Case for tickets for auditorium.
15 Closet seats.

The drawing tables and stools listed above have light steel frames, designed by one of the teachers. They are neat and strong and practically indestructible.

The work was done under the general direction of Mr. Eugene C. Graham, supervisor of industrial arts. The teachers were paid a per diem and the boys received a wage of fifteen cents per hour.

The plan is not new in Evansville. It was tried out in 1914 with success. In all, fourteen grade manual training centers have been equipped during the two years at a saving of $400.

AGRICULTURE AND SCHOOL LESSONS.

Suggestions to help the rural teacher lead her pupils to see the relation between home life and school studies are contained in a new publication of the Department of Agriculture. This bulletin, No. 281, entitled "Correlating Agriculture with School Subjects in the Northern States," contains a plan of work extending from September thru the school year to June. Under this plan each pupil is encouraged to undertake a home project; that is to say, some work at home which will extend thru a whole season, will be connected with the instruction in agriculture which the pupil receives at school, and a record of the results of which will be faithfully kept and turned in to the teacher at the conclusion of the project. At school the pupil's exercises in arithmetic, spelling, English, geography, etc., are so directed that the value of these subjects is made clear. For example, in the language lessons, the pupil may be asked to write out the method which he used in testing milk with a Babcock tester, special emphasis being placed upon the need for making the meaning absolutely clear. In the same way the records obtained from cow testing may be used as exercises in arithmetic, etc.

In the supplement of the bulletin are sample score cards to assist the teacher in rating agricultural exhibits which the pupils should be encouraged to make. The bulletin is designed especially for rural teachers in the Northern States.

NEWS AND NOTES.

ALLEGAN, MICH. Agriculture has been introduced in the high school. The manual training course has been extended in scope.

A "LOCAL INDUSTRIES TEXTBOOK," to contain an outline of the processes of the chief industries of the city of Superior, Wis., is being prepared by Mr. Geo. W. Frederick of the Superior High School. The notebook of a student containing outlines of twenty sight-seeing trips of the "local industries" class will form the basis of the book. The printing department of the school will print the volume.

BIWABIK, MINN. A three-years' course in mechanical drawing has been added to the course in woodwork, turning, and forge work in the Biwabik High School. The department is under the supervision of Mr. W. H. Mulvey.

A VOCATIONAL SURVEY of the city of Fort Wayne, Ind., has been undertaken by Mr. W. E. Gordon, Director of the Vocational Department of the public schools. The survey aims to give school authorities the means of choosing courses which will be suited to the needs of the students.

NOW, ARE THERE ANY QUESTIONS?

Readers are urged to ask questions concerning the Industrial Arts. The editors will reply to those questions which they feel that they can answer, and to other questions, they will obtain replies from persons who can answer them authoritatively. Questions should be addressed to THE EDITORS.

Melting Brass in a Forge.

The following letter is suggestive in supplementing the answer to the question, "How may brass be melted in a forge?"

To the Editor:

In a recent issue of your magazine, "The Industrial Arts," the suggestion was made that brass be melted in a crucible in a forge. Extreme caution should be used for if a little brass is spilled into the forge, the forge cannot be used for welding. A better plan would be to build a small brass furnace and attach up to the blower system in the forge room.

Elgin, Ill., August 15, 1915. *Daniel Green.*

Economy of Time.

Chicago, Ill. Q:—What emphasis, and what provision, should be made for economy of time in the shop during the construction of projects?—*R. R.*

A:—Organize individual operations and for community work organize class into groups, each group under a foreman. It is well to keep cost cards or have a cost account for time, as well as material used, kept on stock and job cards.—*F. D. C.*

Interesting Students.

Indianapolis, Ind. Q:—In case a pupil shows no interest whatever in handwork (elementary woodwork and drawing), should the teacher be held responsible for poor work done by that pupil? What course should the teacher take?—*Teacher.*

A:—Probably the pupil will become interested if allowed to make something which he wants, and which a tactful teacher can help him choose. It is the ironclad sequence of exercises or projects which usually kills interest because there is no possibility of individual initiative.—*F. D. C.*

Furniture Repairing.

Milwaukee, Wis. To what extent should furniture repair, chair caning, etc., be carried on in the grade school classes?

A:—May well be included in upper grammar grade work as an integral part of a woodworking course. Likewise other industrial lines of work may be included if properly related and if they represent constant occupations.—*F. D. C.*

Chest Trimmings.

Brookings, S. D. Q:—Will you kindly give me information as to where I can purchase complete sets of brass and copper trimmings to be used on cedar chests?—R. F. N.

A:—The following firms can supply you with complete sets of brass and copper trimmings for cedar chests:

The Orr & Lockett Hardware Co., Chicago; Grand Rapids Brass Co., Grand Rapids, Mich., and Burns & Bussick Co., Bridgeport, Conn.

Book on Knotting.

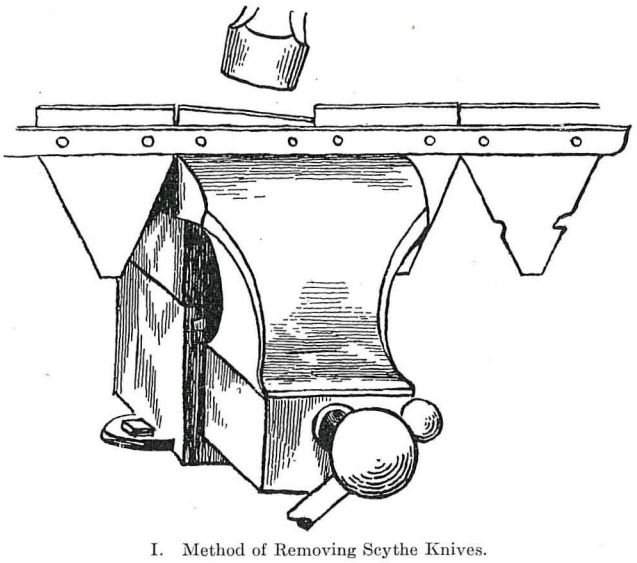
Union City, Ind. Q:—Where can I obtain Verrill's Knots, Splices and Rope Work, mentioned in Mr. Kerchen's article in the August issue?—W. C. M.

A:—Norman W. Henley, publisher, 132 Nassau St., New York. Price, 60 cents.

Removing Scythe Knives.

Arlington, Nebr. Q:—Please state thru the columns of your MAGAZINE, the best way to remove broken scythe knives from the bar of a mowing machine.—*G. R.*

A:—When a scythe knife in a mowing machine becomes broken, the scythe bar is removed from the machine and a new knife put on. In doing this, the rivets which hold the knife in place on the bar, are taken out.



I. Method of Removing Scythe Knives.

It is not good practice to punch these rivets out as the holes are generally countersunk. In punching, there is danger of bending the bar or breaking it. The simplest and best way to remove the knife, is to catch it loosely in a vise with the scythe bar resting on top. The knife that is to be removed is given a few blows with a hand hammer, shearing the rivets when they can easily be punched out. See drawing I.—*Thomas Googerty.*